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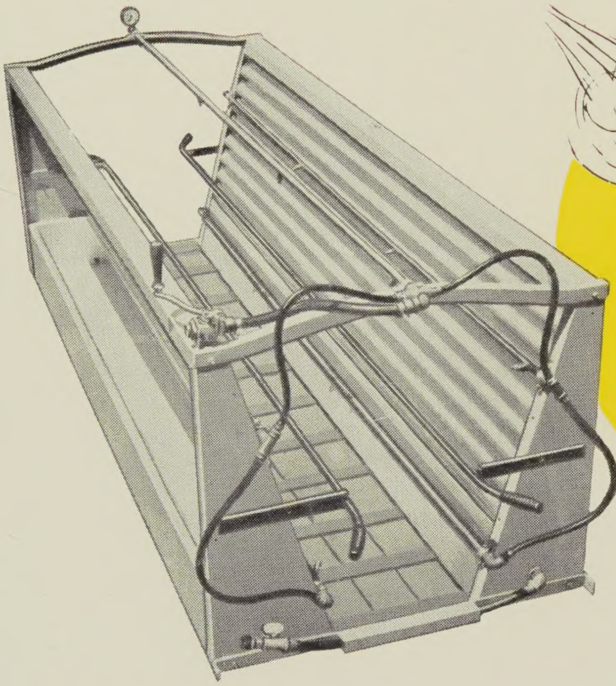

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*A kea or mountain parrot (*Nestor notabilis*) is shown on this month's cover. The kea is found only in the mountainous country of the South Island, mainly above and in the upper reaches of the forests of the western side of the Southern Alps and on the upper slopes of the eastern side. It is an inquisitive, friendly bird, often very amusing, but for nearly 90 years there has been considerable argument about the charge of sheep killing laid against it. Some strenuously defended the bird for many years, but circumstantial evidence and the testimony of sheepowners and shepherds have brought wide acceptance of the charge. There is considerable variation of opinion, however, as to the degree of loss that can be attributed to it. Francis Smith photograph.*

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Britain's Vigorous Agriculture Today Threatens Our Economy

A WARNING that the performance and potentials of the British farmer in meat production threatened not only our national economy but the way of life of the New Zealand sheep farmer was given by Dr C. P. McMeekan, Superintendent of the Department of Agriculture's Ruakura Animal Research Station, in a paper he gave at the Ruakura Farmers' Conference Week recently. As the result of his visit this year to Britain on an Underwood Fellowship offered by the British Agricultural Research Council Dr McMeekan was able to study British farming conditions and to observe the sweeping changes which have taken place in agriculture in the United Kingdom in the last 20 years. His conclusions regarding the effect these changes are having and the programme he considers should be followed to overcome the problem facing the New Zealand meat industry are set out in his paper below. Another paper which he gave at the conference about the impact of British milk production methods on our dairy industry appears later in this issue.

[*Niederer*

Dr C. P. McMeekan, Superintendent of the Department of Agriculture's Ruakura Animal Research Station, Hamilton, who was awarded the order C.B.E. for services to agricultural science in the recently announced Birthday Honours. Dr McMeekan was appointed in charge at Ruakura in 1943 and his own work and that of his staff on animal problems, particularly those relating to livestock farming in New Zealand, have been of great benefit to farmers and have won wide recognition of the Station's research at home and overseas.

NORMALLY a discussion of British meat production would be of but passing interest. Our climate is so different, our techniques so specialised, and our production pattern so limited that the British farmer with his widely diversified farming systems has been remote and somehow unimportant to us. Today the picture has radically changed. Today, as never in history, his performance and potentials threaten not only our national economy but our own way of life as farmers. For this reason this address, along with its follow-up to dairymen, is probably the most important I have ever been called on to make.

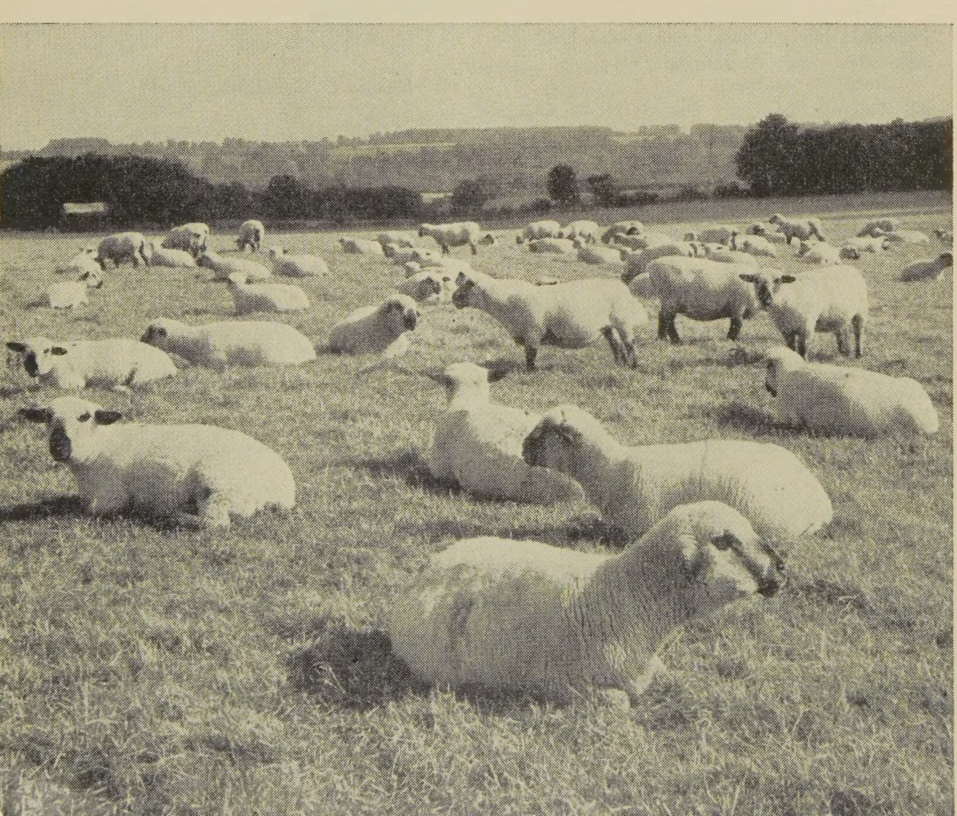
You are well aware of the reality of the current price depression in dairying—a situation due in no small measure to the rapidly expanded dairy industry of the United Kingdom. I would not be meeting my responsibilities today if I failed to impress on you the comparable dangers to New Zealand sheep farmers inherent in existing and potential meat production programmes of Britain.

Present Production Pattern

While at Cambridge School of Agriculture from mid 1936 to the end of 1938 I was able to see most phases of British farming. Though the visit just completed was all too short to see and learn more than a fraction of what I would have liked, it was possible in 4,000 rural miles to observe the fantastic change that has occurred in the British agricultural scene. For the change is fantastic.

Twenty-two years ago British farming was just beginning to emerge from the great depression of the 1930s. Millions of acres were either derelict or poorly used. Buildings, farm equipment, and general facilities were in bad shape. Methods were antiquated. Farm labour was poorly paid and relatively inefficient. Tuberculosis, contagious abortion, and mastitis in cattle were rife. Pastures were neglected and contributed but little to livestock production. Grass silage was known mainly in text books. Low-yielding Shorthorns dominated the dairy world. Cows were still milked by hand. Imported foodstuffs provided two feeds out of every three of all farm animals. Research stations were few in number, poorly equipped, and understaffed. Above all the net

▼ A flock of Hampshire Down sheep on a Cotswold pasture in Gloucestershire.



profitability of farming as a national industry totalled a mere £50 to £60 million a year. (1) Despite all this I learned to admire the tenacity of the British farmer, his deep love of his land, and his really high output in the face of great physical and economic handicaps.

Today British farming has to be seen to be believed, its incredible production performance closely studied to be appreciated. Today almost the whole countryside presents the appearance of well nurtured pasture and crop land. The romanticist's description of Britain as one large, well-tended park has never been more apt. Derelict lands have been brought into cultivation. Wheat, barley, oats, vegetable crops, and pastures now grow where weeds, brush, and copse once ruled. Farm buildings have been renovated and modernised. New buildings designed to do old jobs in new ways are commonplace. Methods are up to date. Mechanisation is at an extraordinary high level. Farm labour is much more highly rewarded, and its versatility much greater. The major cattle diseases are under control.

Pastures have so improved and the efficiency of their utilisation so stepped up that Britain can justly claim to be approaching her once honoured position as the world's leading grassland country. Unbelievably to anyone knowing the conservatism of the English stockman, the Shorthorn in England has been displaced by heavier milking foreign breeds. Artificial breeding controls the destiny of the country's cattle. Home-grown materials supply most of the food of livestock. Artificial fertilisers, particularly nitrogen, are used at an ever-increasing rate for both crops and pastures. Mechanised chemical warfare on weeds is highly successful. The grain drier has revolutionised cereal production, making it relatively independent of harvesting weather. Research stations have been multiplied many times in number and staffing and their facilities are unbelievably good. Government expenditure on research exceeds £5 million a year and private enterprise also invests a tremendous amount. The whole scene is one of a vigorous, prosperous agriculture.

What of performance? (1) Compared with their prewar record United Kingdom farmers are now producing over 3½ million tons more cereals, nearly 2 million tons more sugar beets, and over 1 million tons more potatoes. On the livestock side the extra milk amounts to over 830 million gallons, the extra eggs to over ½ million tons. Meat production outstrips prewar levels by over ½ million tons—¼ million tons more pig meat, ¼ million tons more beef, and 17,000 tons more lamb and mutton. The value of the current total output of agricultural products adds up to the staggering figure of

Programme for the Future

TO surmount the immediate difficulties facing the New Zealand meat producer Dr McMeekan suggested in his paper that consideration should be given to eight points. He said:

From my experience of recent years in Britain and other countries, I believe that the production dilemma facing us must be regarded logically as a two-phase one—a short-term and a long-term problem. Time does not permit any discussion of the latter on this occasion nor more than a brief statement of my views on the former. These are advanced in the hope of stimulating thought and action and as an expression of my own faith in the solid future of New Zealand farming.

A realistic programme to handle the short-term problem must involve at least the following considerations:

1. Holding the United Kingdom lamb market at about 14 million head; keeping the weight down to 32 lb.; selling on scales to guarantee this; instituting a premium grade of Down 2's from which overfat carcasses are excluded; abandoning other Down grades; penalising overfat carcasses at all weights; stepping up efficiency by increasing lambing percentages; reducing ewe flocks proportionately to make room for an expanded cattle population; eliminating hydatids and thereby increasing income and removing what is becoming fast a damaging advertisement for New Zealand meat.

2. Continuing to exploit, but much more vigorously, the Canadian lamb market by high-level industry cooperation with Canadian producers by planned marketing and intelligent advertising. Canada can skim off any surplus otherwise likely to depress United Kingdom realisations.

3. Taking advantage of the present international political climate, the present local meat shortage, and the valuable opening gambits of the secretary of our farmers' federation to make a renewed but high powered approach to United States sheep producers and particularly Californian growers for similar cooperative exploitation of the huge potential lamb market of that country. This approach must embrace all interests at the highest level—Government, meat board, exporter, and farmer—with power to negotiate and to spend money if necessary to institute the trade. The time is now.

4. Organising all interests—Government, shipping, exporters, local traders, unionists, and producers—to develop over the next 5 years an export chiller trade with the United Kingdom of 10,000 carcasses a week—½ million a year. Planning on a contractual basis with farmers so that this target can be doubled in the following 5 years. This capacity is technically feasible and the time to tackle it again is now.

5. Cooperating with the dairy industry to this end by exploiting the great and cheap source of saleable beef inherent in the national dairy herd. Diversion of this product to local markets if eventually desirable as and when adequate supplies of beef type cattle are developed.

6. Achieving this extra meat output by taking up the slack on existing farm lands by better farming and by speeding up the development of undeveloped country to the maximum attainable rate. Using if necessary the "production grant" system of the British—never direct subsidies—to initiate and consolidate this production drive, a fair and reasonable approach, since it is vital to the whole community that our exchange balance be restored and built up if living standards are to be maintained.

7. Stepping up applied research in volume and quality by realistic appreciation of its basic needs. At the risk of being accused of self-interest I firmly believe that this exporting country, in this technological age, cannot afford to relax for a moment its search for greater efficiency if it is to survive in this competitive world.

8. Avoiding, above all things, a standstill policy—a policy which would label us as politically, technically, and morally bankrupt with no rights to the land we are privileged to own. Despite the difficult man-made economics of the present we must not forget that the population explosion now confronting us will mean that the world will have 6,000 million people—twice as many as now—in a mere 40 years. The dangers of standing still are obvious.

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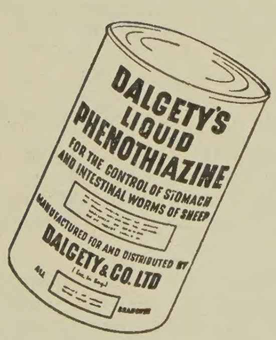
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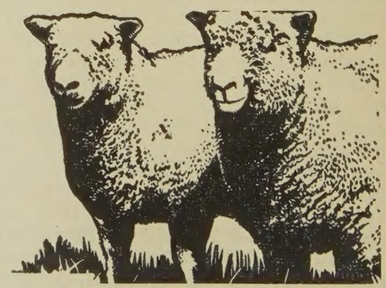

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£1½ thousand million. Impressive as these figures are, much more impressive as a measure of the change in rural prosperity is the net profitability of farming today. For the current year this is forecast as £360 million, a figure over six times as great as that ruling in 1938.

These great changes were of course triggered off by the Second World War. More home-produced food was essential if people were not to starve. The way in which available powers of State and people were channelled into food production is a separate story. Of much greater interest and importance to us is the way in which the greater productivity obtained at that time has not only been maintained, but is being still further increased. What are the forces operating now that the wartime pressures are nearly 15 years past? These are threefold: the political climate, the subsidy system, and the basic ability of the British farmer.

The Political Climate

Politically the British people see nothing inherently wrong in providing a protective umbrella for their farmers. Though the defence argument may not be as strong as it was, the balance of payments, the cheap food, and the social arguments are still sufficiently persuasive to guarantee the continuation of support for home agriculture. In brief, it is argued that more home-produced food means less imported food and a larger overseas exchange balance for other trading activities. More home-produced food guarantees cheaper food, since a shortage in total quantity caused by low local output could increase the cost of supplies from Commonwealth and foreign sources.

Socially a healthy and prosperous agriculture at home is essential for full employment and desirable in terms of international prestige. However one might wonder how long the British citizen will continue to meet the very high taxation cost of farmer support and doubt that he will do so indefinitely, it is my impression that there are no signs as yet of any change in this political climate.

The Subsidy System

It is necessary to have a reasonably close look at the details of the subsidy system if one is to appreciate what we are up against. This year the total amount of direct and indirect aid will amount to £326 million.* (2) This figure averages £900 per farmer, and is almost equal to the total net profitability of farming.

In an effort to reduce the total cost, and to stimulate increased efficiency, the Government reduced the total amount for next year by some £20 million at its recent price review and altered its basis in respect to certain items. Guarantees were lowered to discourage the output of further milk, wheat, pig meat, and eggs, which tend to be in oversupply; they were increased to stimulate further beef output. It should be noted that the price-support programme, guaranteed 4 years ahead, calls for an annual review with no more than an overall permissible drop of 2½ per cent in any one year. This mechanism is being used today to stimulate increased efficiency in terms of cost of production.

It is instructive, too, to have a look at the way in which price supports and production aids affect an individual producer of meat. (1) Here it must be remembered that there are very few specialised meat producers in Britain. Beef cattle and sheep are kept as part of complex farming enterprises within which they may be of either major or minor importance. If it is assumed that a farmer produces both cattle and sheep, he receives direct price support on fat cattle averaging 24 per cent of the market price. This amounts to approximately £18 per fat steer of 550 lb. carcass weight. His lambs carry a direct subsidy of approximately 21 per cent, averaging £1 13s. 4d. per 50 lb. carcass. His wool is enhanced in value by 21 per cent, or 1s. per lb. Incidentally, the guaranteed price for beef is £13 per 100 lb. carcass, for lamb 3s. 3½d. per pound, and wool 4s. 8d. per pound.

This of course is but a small fraction of the picture. (3) If the farmer in question maintains a beef-type cow on hill country, he receives an annual grant of £10. If she weans a calf to 8 months of age, she carries another grant of £8 to £10 for a steer and £7 to £10 for a heifer. If the calf is fattened, addition of the average beef subsidy of £18 brings the total amount of assistance to £36 per cow in a gross of £89. Similar grants may be made in respect to hill-country breeding ewes, the amount varying with market prices.

This meat producer is, of course, not done yet. Should he use fertilisers in growing grass or fodder crops, his nitrogen carries a subsidy of £10 per ton, his phosphates one of £6 to £15 per ton, and mixed fertilisers a pro rata rate. Lime carries a subsidy of 50 per cent. Should he purchase any grain for wintering, rearing, or topping off sheep or cattle, the cost is reduced because of the grain subsidies. Should he plough up a temporary pasture that has been down at least 3 years, he receives a grant of £7 per acre, £12 if the sward has been down 10 years.

These cover most of the direct aids, but there are many sources of indirect assistance—production grants—which may also help the meat producer. Improvements to water supply and drainage carry grants of 40 and 50 per cent of the cost. Should farmhouses or cottages need renovation or replacement, they carry supports of up to £400 each and a taxable write-off of 10 per cent a year. To one paying supertax, the net cost thus becomes one quarter of actual. The building of a silo brings a grant of up to £250. If the farm concerned is on hill country, special grants are available for eradication of bracken and rabbits. Thirty per cent of the cost of land reclamation can be obtained.

Even now we do not have the full story. As emphasised earlier few men are specialised meat farmers; most produce grains, many produce milk, some add pigs and poultry. Since all these enterprises are integrated into the individual farm production pattern and since it is not practicable to cost any one enterprise independent of the others, our hypothetical meat farmer may also receive the subsidy assistance available for grain, milk, pig, and egg production to assist his overall profit-earning capacity.

Basic Farming Ability

In terms of basic farming ability the British farmer is good. Let us make no mistake about this. He is not perfect by any means. He has many weaknesses and his efficiency is low in many departments, but his performance in the face of severe climatic limitations speaks for itself. He is getting much more efficient. He is constantly on the watch for new ideas, which, despite his national heritage of traditionalism, are rapidly incorporated into his farming enterprises. I was intrigued to note the many ideas for new practices which he has obtained from us in the last 20 years. His interest in research is intense and many are fully aware even of our work in New Zealand.

Let us have a closer look at his meat production efficiency and methods. Though the meat animal accounts for only about one-quarter of his gross income and most of his land is used for other purposes, he does find room for nearly 5 million beef cattle, 12 million sheep, and 5 million pigs. (4) From these he produces more than 850,000 tons of beef against our 240,000 tons, over 200,000 tons of mutton and lamb against our 350,000 tons, and over 700,000 tons of pig meat compared with our meagre 40,000 tons, more than 1¾ million tons of meat or almost three times the total New Zealand output. (1)

Beef is raised partly from the offspring of single-suckled beef cows, partly from the fattening of Irish stores, partly from multiple-suckled or hand-reared crossbred beef dairy-

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* Direct £210 million; production grants £76 million; school and welfare milk £40 million.

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type calves, and partly from surplus dairy-type cattle. Calf rearing on milk substitutes is highly efficient, so that this spring one found almost every spare pen in shed or barn occupied by this class of stock. Reared inside on milk substitutes, grain, hay, silage, and roots, they go to grass in summer, and are finished indoors by heavy supplementary feeding during their next winter. Alternately they may be wintered more cheaply to finish on grass in their second summer. Grass silage plays an increasing role and the use of self-feeding systems for utilising it is proceeding rapidly.

Special pastures for beef are more widely used than ever before. In the main these are short-rotation leys of which the timothy-meadow fescue combination is favoured. Stimulated by heavy nitrogen dressings of up to ½ ton per acre, they yield a great bulk of high-quality fodder used partly in situ and partly as silage and hay.

Outwintering of cattle is proceeding as farmers learn to exploit special-purpose pastures which extend the growing season and as they develop management methods to enable such swards to be carried through and used during winter. Lucerne-cocksfoot leys are used for this purpose.

In the main, however, the target of most producers is to get their cattle away fat as young as possible so that finishing autumn-born calves inside in winter and spring-born calves outside on grass in summer is the objective of the more efficient farmers. Home-grown and imported grains still play a dominant part in the ration of fattening stock. To this extent production is expensive and its economy questionable except under the present price support system. Greater dependence on home-grown fodders is being keenly sought.

The minimum weight for price support and quality premiums in beef cattle is 450 lb. dressed. Carcasses are down graded for excessive fat. A light-weight 500 to 550 lb. steer grossing £90 is the normal product. Crossbred beef dairy stock are of surprisingly high quality, calves realising £13 to £20 each at birth. Even purebred Friesian calves command as ready a sale at similar figures.

Sheep production, except in parts of Scotland and Wales, is essentially a sideline enterprise, the potentials of which have not yet begun to be exploited. Today the sheep is often the most profitable animal on a British farm. Sheep numbers fell drastically during the war because of their low priority rating. The national flock has now increased beyond its prewar level and is on the upgrade. However, the majority of individual flocks are still handled largely as scavenger units rather than as highly profitable enterprises in their own right.

Despite this sideline outlook, the British sheepman puts us to shame in the lambing percentages he obtains. In England during the recent lambing, which occurred under heavy snow and a bitterly cold spring, I became very chagrined at the monotonous collections of twins in every field. Small flocks of 50 to 200 ewes, individual lambing attention, and provision of adequate shelter undoubtedly play a part in the 150 to 180 per cent lambing figures. But one cannot escape the conclusion that the inherent fertility of British sheep is far superior to ours.

The English sheep flock is kept primarily for meat and has been selected to this end. Wool is poor and very variable. Crossbreeding of a multiplicity of breeds is the rule rather than the exception. Rate of growth of lambs is phenomenal and much better than ours, the British lamb averaging 40 to 50 lb. carcass weight in the same time as ours take to attain 30 to 35 lb. Big framed, heavy conditioned ewes selected for high fertility and milking ability over many generations have certainly produced highly productive meat sheep. Lambing is extremely concentrated, being virtually over in 3 weeks. Dry ewes are rare and lambing losses low. Can we match these two examples, admittedly among the best that I met and was able to check?

1. 208 ewes lambing 3 quads, 48 triplets, 126 twins, and 31 singles—a total of 439 lambs or 210 per cent. This particular farmer's target is a flock that will wean 300 per cent of lambs.

2. 401 ewes mated, 1 dry, 721 lambs sold—180 per cent; lambs sold at average carcass weight of 53 lb., yielding a gross return of £6,400 or £16 per ewe.

Undoubtedly we have much to learn from British sheepmen in this, the greatest weakness in our own fat-lamb industry. At the same time it is probably in the field of sheep management that the New Zealand farmer has most to offer his British counterpart.

The Future

What of the future? This is the crux of this outline of British meat production, since it is future developments that can have such profound impacts upon our own policies. One view of the future pattern of British production is obtained from the recent statement of the Government in its White Paper on price supports. (1) Setting out official policy, this lists as objectives of the new price guarantees:

1. The maintenance of a large arable acreage something like the current size, but with more emphasis on feed crops rather than wheat,
2. Greater reliance on home-produced feed for livestock,
3. The production of more beef and lamb of the quality wanted by the market, and
4. The production of less milk, pig meat, and eggs.

Objective three (the production of more beef and lamb) is the one with special application to us. What are the prospects? Undoubtedly more of these two products can come from British farms.

The most significant fact about the present and future beef situation is the marked extension in the use of beef bulls on dairy cows for crossbred beef production. This year over 45 per cent more dairy cows were inseminated by beef bulls than last year. Half a million cows were so mated—over 35 per cent of the total dairy cattle inseminated. (4)

The full impact of this dramatic change will not be apparent until the 1960-61 production season, when the resulting calves reach the market as finished beef. To improve the already-high quality of such animals the Milk Marketing Board is co-operating with the Ministry of Agriculture in experiments to determine the best kind of bulls for crossing and is developing performance testing of beef bulls of different breeds as a guide to selection. Considerable pressure also exists for the introduction of the French breed, Charollais, as a method of stepping up the growth rate of crossbred cattle.

There is no question that these extra cattle can be fed. Improved pastures with greater seasonal spread, more silage production, extended use of self-feeding, more forage crops, and cheaper imported grains will guarantee this as long as the present price support system is maintained. At the same time informed opinion, for what it is worth, considers that Britain is unlikely to produce more than 60 per cent of its beef requirements even with subsidy aid.

On the sheep side the scope for increased output is relatively much greater. This is a personal view, but one subscribed to by a large number of the more successful British sheepmen. The present national ewe flock is carried at the low stocking rate of 1 to 1½ ewes per acre. Individual producers are up to the 3 to 4 ewe per acre mark now; some are as high as 6 ewes plus 9 lambs per acre over the productive period.

Once the British sheepman loses his fear of internal parasites, handles sheep not as scavengers but as key animals in his enterprise, develops better grazing methods, and learns how to manage higher stocking rates, flock numbers must increase. The increasing demand for lighter and leaner lambs which is beginning to affect even the home producer will reinforce this change. At the very least the national flock could well be doubled with little trouble in a few years. At present qualified shepherds are hard to get, but one would be indulging in wishful thinking to imagine that this lack will prevent progress permanently. Both these trends toward more beef and more lamb meat are likely to be accentuated by the current State policy of static grain production, less milk, fewer eggs, and less pig meat.

Of special significance to us as Britain's main source of imported lamb is the threat of increased home production of this commodity. The most informed trade interests consider that the saturation point in lamb meat can be expected to be somewhere round the 20 million head mark. With over 14 million from us and 4 to 6 million from home we are very close to this now.

The idea of Britain as a bottomless market for our lamb must in my judgment be dismissed as a pipe dream. We must look for additional markets to cope with future lamb meat increases unless we are prepared to suffer the same fate as has already overtaken our dairy colleagues.

On the beef side the outlook is better. Despite local potential production most British meat trade interests believe that beef is our best bet for the future. All agree that if we concentrate on producing and shipping in an orderly, regular fashion chillers of the quality supplied last year, we could become a major factor in Britain's higher-quality meat trade. The present trends and political climate in respect to the traditional supplier, Argentine, are in our favour. Courage, imagination, initiative, and a new outlook on our part are necessary now if this potential is to be exploited.

One note of caution must be sounded. A new factor of unknown significance has entered the British meat trade. With a current output of 10 million birds and a widely publicised target of 100 million a year the fast developing broiler industry, supported as it is by large-scale industrial enterprises, could make grave inroads in the market for other classes of meat. Present guessers suggest lamb will be more vulnerable than beef. If so, this points to beef again as a safer bet than lamb in our future thinking.

References

1. White Paper Command 390: "Annual Review and Determination of Guarantees March 1958".

2. "Ministry of Agriculture Official Forecast", supplied by Agricultural Guarantees Division, 22 May 1958.

3. "At the Farmer's Service", Ministry of Agriculture, 1957.

4. Milk Marketing Board Intelligence Bulletin No. 119, 26 February 1958.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers during September are as follows:

1YA Auckland, 7.45 p.m.

3 September—"Potato Growing", by D. M. E. Merry, Instructor in Agriculture, Department of Agriculture, Pukekohe.

10 and 24 September—Talks by officers of Animal Industry Division, Department of Agriculture, Auckland.

17 September—"Cropping for Facial Eczema Prevention", by H. McM. Bull, Instructor in Agriculture, Department of Agriculture, Auckland.

1XH Hamilton, 12.33 p.m.

8 September—"Stock Problems of the Month", by L. P. Wells, Livestock Instructor, Department of Agriculture, Hamilton.

15 September—"Weed Control", by J. R. Murray, Instructor in Agriculture, Department of Agriculture, Hamilton.

22 September—"Nitrogen Deficiency in Pasture Plants", by K. J. McNaught, Department of Agriculture's Rukuhia Soil Research Station.

29 September—"Agricultural Education", by E. A. Neill, Federated Farmers, Hamilton.

1YZ Rotorua, 7.15 p.m.

3 September—"The Rearing of Dairy Stock", by E. O. Pederson, Livestock Instructor, Department of Agriculture, Whakatane.

17 September—"Spring Topdressing", by S. D. Clay, Instructor in Agriculture, Department of Agriculture, Matamata.

2XA Wanganui, 8 p.m.

4 September—"Canadian Newsletter", by Mary MacDonald.

11 September—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

18 September—Talk by C. M. Bailey, Supervisor, Taranaki District Pig Council.

26 September—"Strawberry Growing", by G. N. Paulin, Horticultural Inspector, Department of Agriculture, Palmerston North.

2XG Gisborne, 8 p.m.

9 September—Talk by J. D. Overbye, Horticultural Instructor, Department of Agriculture, Gisborne.

16 September—"Spring Crops for Facial Eczema Prevention", by H. de O. Chamberlain, Instructor in Agriculture, Department of Agriculture, Gisborne.

23 September—Talk by E. B. Smythe, Livestock Instructor, Department of Agriculture, Gisborne.

2YZ Napier, 7.10 p.m.

9 September—"Soil Conservation", by J. L. Porter, Soil Conservator, Department of Agriculture, Hastings.

23 September—"Meat Grading at Works and Abattoirs", by C. P. Bell, Meat Inspector, Department of Agriculture, Hastings.

2ZA Palmerston North, 12.33 p.m.

8 September—"Chicken Raising", by M. E. White, Poultry Instructor, Department of Agriculture, Levin.

15 September—"Potato Growing in the Manawatu", by J. A. Graham, Fields Instructor, Department of Agriculture, Palmerston North.

22 September—"Soil Deficiencies", by G. N. Paulin, Horticultural Instructor, Department of Agriculture, Palmerston North.

3YA Christchurch, 12.20 p.m.

1 September—"Spraying Home Garden Fruit Trees", by J. Coombe, Horticultural Instructor, Department of Agriculture, Christchurch.

15 September—Review of "New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.33 p.m.

1 September—"Lambing Hygiene", by R. G. Buchan, Livestock Instructor, Department of Agriculture, Gore.

8 September—"Latest Weed Control Methods", by R. C. Stephen, Instructor in Agriculture, Department of Agriculture, Balclutha.

15 September—"Cereal Growing", by T. G. Sewell, Instructor in Agriculture, Department of Agriculture, Gore.

22 September—"Diseases in Poultry", by J. Jones, Poultry Instructor, Department of Agriculture, Oamaru.

29 September—"Lucerne Growing", by A. R. Rankin, Fields Instructor, Department of Agriculture, Invercargill.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m.

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month at 12.33 p.m.), Thursdays at 12.33 p.m.

2XA Wanganui, Wednesdays at 8 p.m. (stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

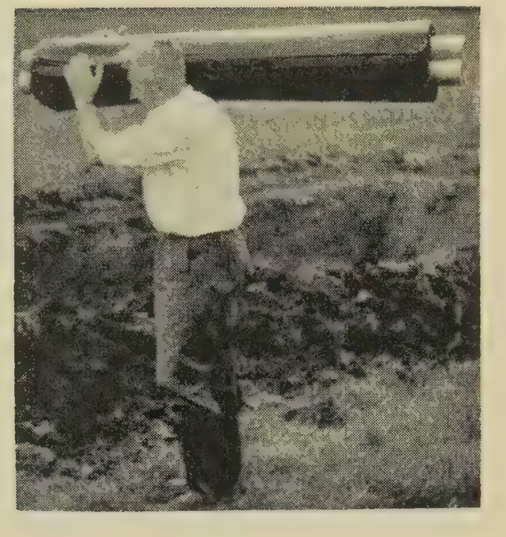
3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m., Wednesdays at 12.33 p.m. and 6.50 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m. and 7.15 p.m. (Lorneville and Gore stock market reports), Wednesdays at 12.33 p.m., Thursdays at 12.33 p.m.

Plastic-lined Temporary or Special-purpose Water Storage Tanks

By J. L. DOUTRE,
Machinery Instructor, Department of Agriculture, Auckland



[*Sparrow*

This parcel of plastic, easily carried to the tank site by one man, covers an area of 45 ft. x 25 ft. and will impound 12,000 gallons of water.

THE construction near Kaharoa, north of Rotorua, of a 150,000-gallon plastic-lined dam was described in the July issue of the "Journal". The use of plastic material for temporary or special-purpose water storage tanks is discussed in this article.

THE Soil Conservation and Rivers Control Council initiated construction of New Zealand's first plastic-lined tank. It was excavated in raw pumice at Earthquake Flat, near Rotorua, to provide a temporary water supply for aerial fire-fighting demonstrations. This tank has been full since it was put down in October 1957. When its purpose has been fulfilled the tank will be emptied and the lining either stored away from light and heat or used for a temporary tank elsewhere.

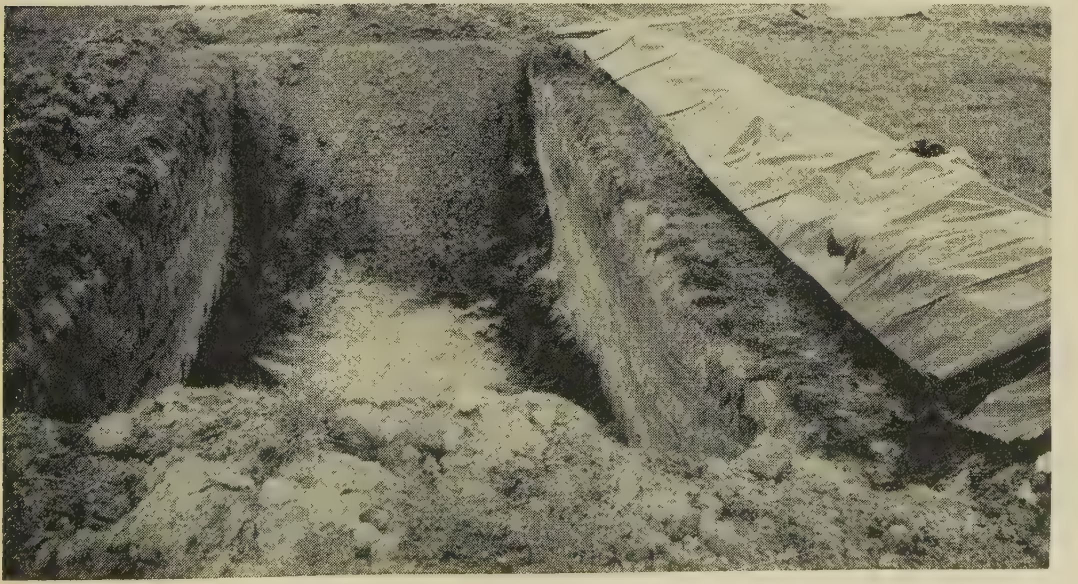
Plastic-lined tanks can be quickly and easily built simply by excavating a pit 6 to 7 ft. deep with a bulldozer blade. The walls and floor surfaces should be smoothed with a shovel to break down any hard projections and fill sharp corners. A plastic lining can easily be carried to the site by one or two men and rolled out along one edge. It is then pulled across by two men, each taking one corner. Once the liner is in place the edges should be secured by covering them with turf on the smooth ledge that has been provided at the edge of the excavation. The sloping ends are secured in the same way. Any excess material at the corners of the tank is simply folded and water pressure will hold it in place. There should be sufficient slack in corners for the plastic material to be supported on the soil.

Protecting Plastic from Damage

If livestock have access to the area, further protection by fencing should be provided, as their sharp hooves can penetrate the lining, especially if an animal is pushed into the pond and tries to scramble out at the sloping ends.

For special tank installations where water is to be held for several months, or possibly years, some type of cover should be provided to keep the sun off the liner. In large, shallow ponds the plastic can be covered with a 4 in. layer of soil. For smaller, deep tanks where it is desirable to keep the water clear or free from soil particles a roof to cover the tank should be built.

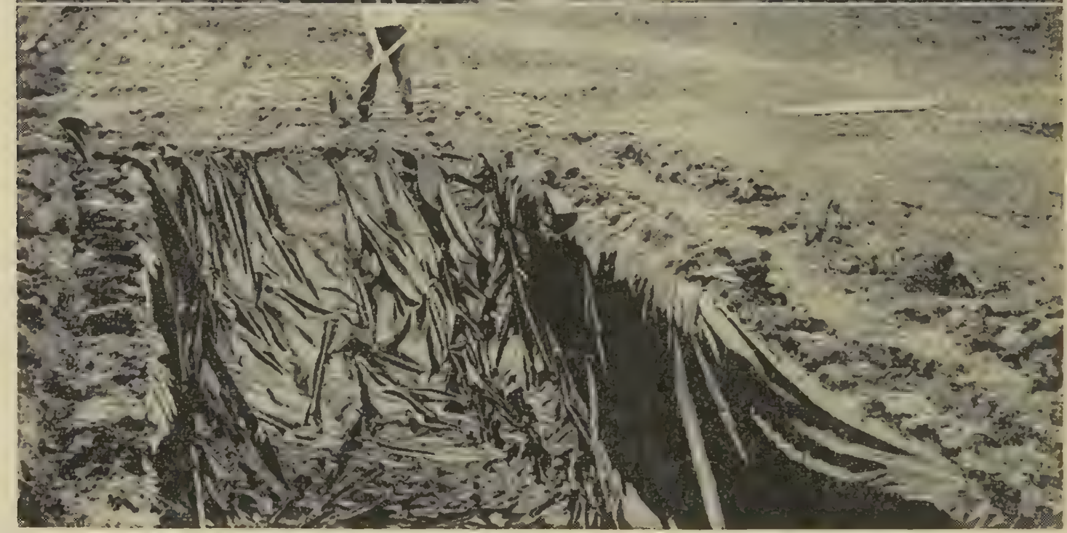
Leaking concrete or wooden tanks can be lined by plastic sheets after the inner surface of the tank has been smoothed and any cracks have been levelled or filled. The plastic imparts



The pit has been smoothed and sharp corners filled to prevent undue strain on the 8/1,000 in. thick plastic liner. The plastic has been unrolled so that one man at each end can take the leading edge and carry it across the pit.

One edge has been anchored down with earth to prevent its falling into the tank. Centring and straightening are proceeding so that wrinkles are removed without leaving undue tension.

The black polythene liner in place and edges being covered to prevent the liner from slipping into the pit.

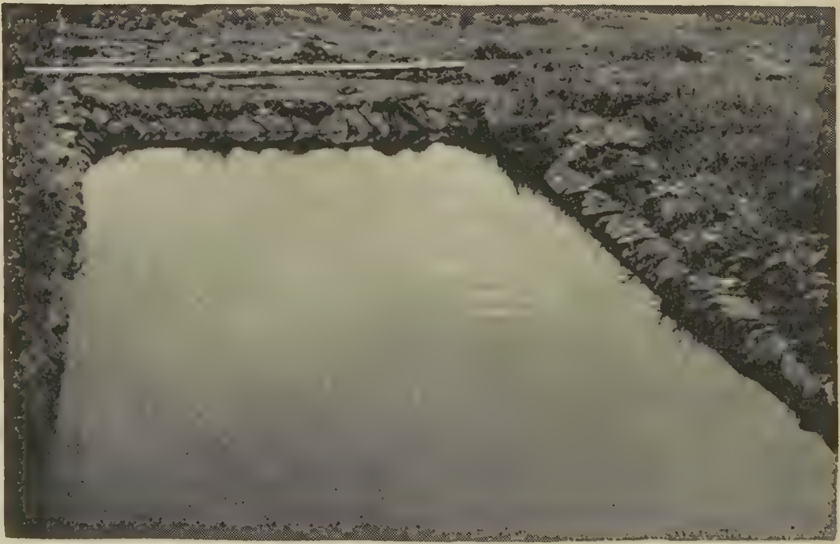


no taste to the water and provides a poor surface for algal growth. It is not affected by fungus or bacterial attack, but should not be used for storage of oils or solvents.

Tanks for Fire Fighting

Water storage tanks for fire fighting near forest stations or at timber mills are being investigated by the New Zealand Forest Service and some plastic liners have been purchased. Consideration is being given to providing plastic-lined tanks at strategic points through the forests for fire fighting. A little water applied early can be just as effective as much more after the fire has taken hold.

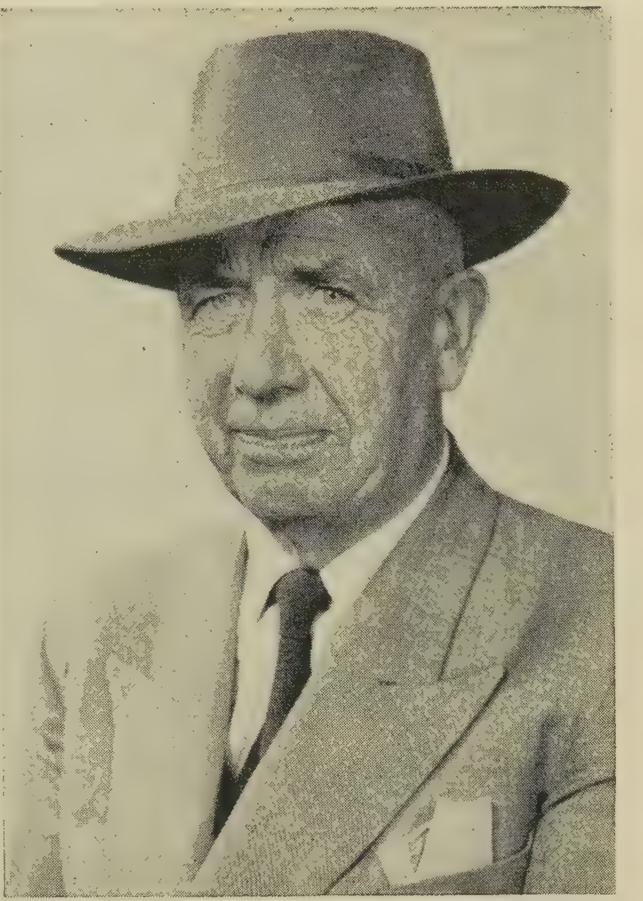
Plastic sheeting has a wide field of agricultural application and tests of cost and performance show advantages over more costly, permanent construction materials.



The tank has been filled with water and has remained full since October 1957.

Mr R. B. Tennent's Retirement from Director-Generalship

WITH his retirement from the position of Director-General of Agriculture at the end of this month Mr. R. B. Tennent completes 38 years of service with the Department during which he has done much, at first as an instructor in the field and later in administrative posts, to develop and establish the high reputation of the extension services of the Department.



Mr Tennent.

MR TENNENT was wont to remark that he was born at the same time as the Department. He entered its service at Dunedin in 1920 as Instructor in Agriculture, and it would not be too much to say that he and the Department matured together, as his hand was in much of the shaping of the present organisation of its services.

Throughout his service promotions as Fields Superintendent, Director of the Fields (now Extension) Division, Assistant Director-General, Deputy Director-General, and Director-General the qualities that made him an efficient instructor in agriculture guided his work in his subsequent administrative posts.

As an instructor he rapidly became a leader in the science and practice of farming in Otago and Southland. He initiated improved farming practices which, though commonplace today, were innovations in the 1920's. He advocated and demonstrated more efficient grass farming practices, particularly phosphatic topdressing, liming, and efficient grazing management; he pioneered irrigation farming in Central Otago and irrigation practices both in Otago and Canterbury are largely based on his early work. In all this work he showed the highest attributes of an instructor, for besides advocating and demonstrating improved practices, he carried the farmers with him and saw his suggestions put to work. Subsequently as Fields Superintendent, Dunedin, he trained a staff of junior instructors in the principles and practice of farm advisory work.

As Director of the Fields Division he inspired the Division to give its best to the service of farming. His success lay in recognising that the Division's work was in the hands of district instructors in agriculture and that his sphere as Director was to lead and inspire rather than direct.

The Young Farmers' Club movement had his wholehearted support from its inception in Otago and he has continued to do much to help the development of the federation to its present place as an indispensable part of the farming industry.

He is an authority on grassland farming and in 1948 visited Britain to assist in a campaign for grassland development. In 1956 he went to Japan to advise the Japanese Government on the development of hill country pastures and livestock management.

Mr Tennent represented New Zealand overseas on many occasions. He undertook a mission for UNRRA to China in 1946 to investigate the advisability of New Zealand's supplying dairy cattle to China. He attended the third meeting of the International Federation of Agricultural Producers at Guelph, Ontario, Canada, in 1949 and visited the United States to promote interest in New Zealand seeds. In 1950 he returned to establish trials of New Zealand grass seed mixtures there.

Mr Tennent led the New Zealand delegation to the conference of FAO in Rome in 1953 and later went to the United States of America for discussions regarding the sale of New Zealand seeds. He was leader of a New Zealand delegation to Japan in 1955 to investigate the fused calcium-magnesium process for the manufacture of phosphatic fertiliser and has been to Australia several times and to Nauru and Ocean Island. He was recently appointed New Zealand's representative on the British Phosphate Commission.

He led delegations to the FAO conference in Rome and to the first of annual discussions between New Zealand and Britain on agricultural and trade policies in 1957, and was a member of the official delegation to visit London in April this year to discuss with the United Kingdom Government a revision of the 1932 Ottawa Agreement. Subsequent to the appointment of this delegation the Minister of Agriculture, Mr C. F. Skinner, went to London to discuss problems relating to markets for meat and dairy produce in the United Kingdom and Mr Tennent accompanied him as official adviser. Mr Tennent remained in London to discuss the Ottawa Agreement when Mr Skinner returned to New Zealand. After the talks in London Mr Tennent visited Rome to discuss problems of the meat trade with Italy.

Mr Tennent's wide practical knowledge of farming and his close association with the Department's experimental and extension work made his opinion widely sought and valued by industry organisations and his services, though constantly called on, were always cheerfully given to any project furthering the interests of primary production. Many tributes paid to him on the eve of his retirement testify to the high regard in which he was held by both those with whom and for whom he worked.

Ruakura Conference Week Continues

THAT the Ruakura Farmers' Conference Week is regarded as a major event in the farming year of many North Island farmers and more than a few South Island farmers was abundantly proved by the crowded attendances at all sections of the tenth Conference Week held recently at the Department of Agriculture's Ruakura Animal Research Station. Nearly 1,000 sheep farmers and about the same number of dairy farmers heard the papers prepared for their respective sections, and about 4,000 people visited the Station for the field day.

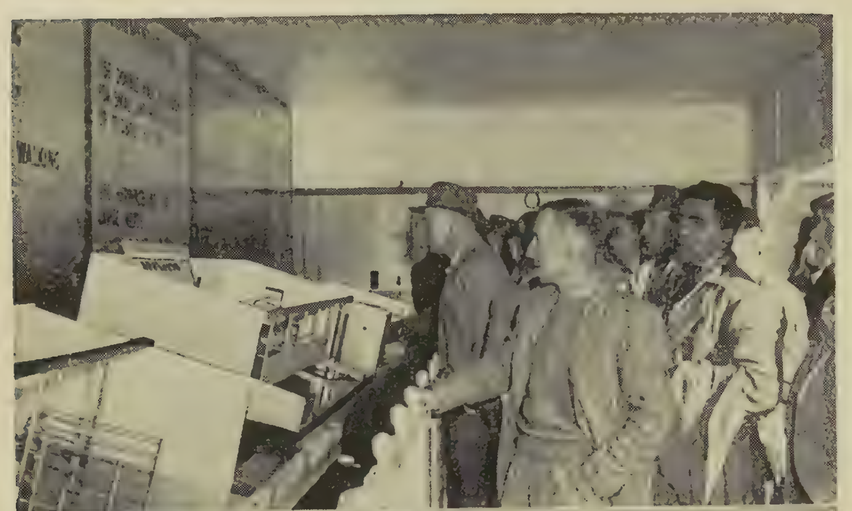
WHEN it was originated in 1949 the Ruakura Farmers' Conference Week tended, naturally, to have a pronounced Waikato flavour and drew its audience mainly from local farmers. Dairy farmers used to outnumber the sheepmen by at least 2 to 1; the fact that today the numbers of each are practically the same is an indication of both the increasing interest in sheep in the Waikato and that the Conference Week has relinquished its district bias and has advanced to national status.

A handicap of earlier conferences—the holding of the field day at the Station and the other sessions elsewhere—was permanently overcome this year by the opportunity to use for the first time the Ruakura Farmers' Hall, centrally situated on the Station.

Lively Fire of Questions

Throughout the conference all speakers giving papers were subjected to a lively fire of questions from their audience, and the demand for information seemed insatiable. Fruitful discussion which resulted from the points raised by farmers had to be terminated only because lack of time prevented its continuation.

Presiding over these formal sessions was the Superintendent of the Station, Dr C. P. McMeekan, who introduced a delightful leaven of humour to the proceedings with his puckish comments. A few days before the conference began Dr McMeekan returned to New Zealand from a visit to Britain on an Underwood Fellowship, granted by the British Agricultural Research Council, and he presented two papers about the impact of British meat and



← TOP—Visitors at the field day inspecting models of different types of milking sheds at the No. 1 Dairy.

MIDDLE—Dr D. G. Edgar explains the reproductive process in sheep.

your sheepskins ?
This way with-
Better gradings.
Spirited competition.

BOTTOM—J. H. Drake describes faults which should be avoided in the handling of sheepskins for market.

to Attract Great Farmer Interest

milk production methods on the New Zealand meat and dairy industries. He remarked when presenting the first of these papers, both of which are published elsewhere in this issue, that they were probably the most important he had ever been asked to give.

Field Day Popular

In the organisation of this 1958 Conference Week the Station staff combined as a team to produce the usual smooth-flowing, pleasing event, the highlight of which was the field day midway through the week, when the Station was thrown open to public inspection and thousands of visitors were moved around the property to hear explanations of the research projects and to see phases of Ruakura work demonstrated.

Twelve demonstration points were set up and to these two continuous streams of visitors were driven by bus, one circuit being for dairy farmers and the other for sheep farmers.

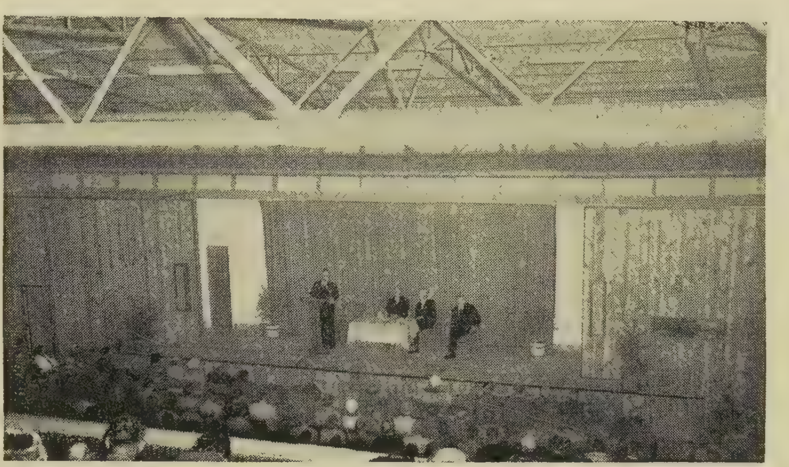
At No. 1 Dairy dairy farmers saw a milking machine circulation washing system devised at Ruakura. This attachment, which could be applied to any orthodox milking machine, consisted of a pipeline along the milking shed connected to a bucket of water and detergent, which was pumped continuously through the milking machine and back to the bucket. All washing of the machine was thus done without the need for carrying buckets of water into the bails. An additional attachment provided warm water at the teat cups for teat washing.

Two other exhibits at the same dairy—a series of three models of tandem, herringbone, and walk-through milking sheds and a diagram in which processes in the cow's milking system were depicted by flashing lights—created much interest.

"Milk is liquid gold" was the theme of the piggery demonstration, where early weaning was recommended and where pig keepers were succinctly told: "Don't let your pigs be suckers all their lives; feed them directly from the trough". Early-weaned litters were shown at 3, 4, 5, and 6 weeks of age.

Also displayed were four groups of porkers to indicate correct and incorrect methods of feeding. The first group had been fed ad lib. and was overfat; the second, fed half the Ruakura-recommended ration, was miserable and underfed; and the third group, fed the Ruakura-recommended ration as half milk and half meal, and the fourth group, also fed the Ruakura-recommended ration but as all milk with copper sulphate, were desirable weights. The first and second groups consumed 4½ gallons of milk to put

Farmers' Hall at Ruakura Opened



This year's Ruakura Farmers' Conference Week was the first to be held in the Ruakura Farmers' Hall, which has been built on the Station adjoining the new laboratory block recently occupied by the staff.

Planned 4 years ago, when the need for such a building for Conference Weeks was being badly felt, the hall cost £36,000 to construct and was paid for by subscriptions raised by farmers and businessmen, by donations from the three producer boards, and by Government subsidy.

"The farming community, which has shown a keen interest in the research work of Ruakura, could not have erected a better monument to the Station's achievements," commented the Leader of the Opposition, Mr K. J. Holyoake, in officially opening the hall at the conclusion of the field day of the Conference Week. He said increased farm production had been made possible by the research worker, who had often had to work for years with only slight signs of progress toward his final goal. Each year farmers were raising their sights to follow the example set by Ruakura, Wallaceville, and other research institutions. He praised the forethought of those who had striven to have the hall established.

The body of the hall will hold 500 people, a cafeteria extension which can be opened to form an addition to the hall will accommodate 300, and a gallery which includes a projection box for screening slides and films will seat 200. The floor is concrete overlain partly with cork and partly with linoleum tiles.

Constructed with a tubular steel framework, the building is steam heated, fitted with fluorescent lighting, and finished inside in varnished pine panelling. The outside walls are of aluminium and concrete panelling.

Though maintenance of the hall is the responsibility of the Station, control of the building is vested in a committee on which farmers are represented.

The front of the hall, with part of the new laboratory block on the right.

FARMERS!

COPPER deficiency in beef animals has been evident in some areas in New Zealand in greying of the coats of Aberdeen Angus cattle and unthriftiness. The condition can be prevented by increasing copper supplies to the animals and effective and cheap control of the disease has been achieved by a method of subcutaneous injection of copper compounds arising from research into the disease by the Wallaceville Animal Research Station. Copper remedies for treating animals can now be bought and farmers can get advice on their use from veterinarians or Livestock Instructors.

Extract from an article by Dr. I. J. Cunningham in the September, [illegible] issue of the Journal of Agriculture.

GLAXO COPPER INJECTIONS
FOR CATTLE AND EWES

These forms of Copper Injection are as prepared at the request of the Department of Agriculture Animal Research Station, Wallaceville.

Glaxo Copper Injections are available from Veterinary Surgeons, Chemists and Stock and Station Agents everywhere. Both forms are presented in tins of 12 tubes, each tin containing one hypodermic needle and a leaflet giving directions for use.

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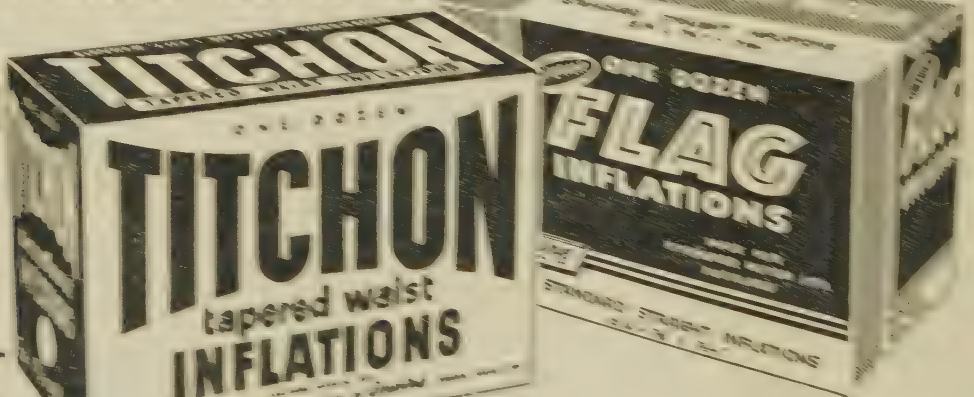

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1 lb. of meat on the carcass, compared with 3½ gallons required by the third and fourth groups.

Artificial Breeding

The New Zealand Dairy Board's Artificial Breeding Centre at Newstead was the third point visited by dairy farmers and there yearling bulls bought this year for use in the 1958 season were seen. All these bulls were by top production merit sires and from top Intermediate Merit Register and Lifetime Merit Register pedigree cows. Two groups were naturally bred and two artificially bred. Slides illustrating the handling of semen—its collection, dilution, testing for quality, dispatch, and insemination into cows—were projected and equipment used at the Centre was exhibited. According to statistics on view the number of cows inseminated throughout New Zealand has risen from 1596 in 1949 to 231,500 last year.

High Production Figures

Comparisons of production figures from four herds each of 40 cows were given at No. 2 Dairy, where experiments were being conducted to find the effects of grazing management and stocking rate on dairy cattle performance. The first herd, rotationally grazed on 42 acres, produced in the first season of the trial, 1957-58, 426 lb. of butterfat per cow or 406 lb. per acre; the second herd, rotationally grazed on 33½ acres, produced 399 lb. of butterfat per cow or 477 lb. per acre; the third herd, set stocked on 42 acres, produced 402 lb. of butterfat per cow or 383 lb. per acre; and the fourth herd, set stocked on 33½ acres, produced 366 lb. of butterfat per cow or 437 lb. per acre.

At No. 5 Dairy silage investigations, calf rearing, strip and paddock grazing, and the right time to feed out hay and silage were discussed, samples of poor, fair, good, and excellent silage being displayed.

The dairy farming tour was completed at No. 4 Dairy, where the Station's work with identical twin calves was explained. These twins are used for experiments to investigate grazing management, bloat, milking methods, and summer feeding. Sixty-five sets of identical twin calves are required for further experimental work at Ruakura this year and for the supply of these the Station has to rely on farmers making them available.

Facial Eczema Research

Ruakura's methods of investigating the cause of facial eczema were described at the first demonstration point for sheep farmers, to whom coloured slides illustrating the progress of the work were shown. They were informed that the latest development in this research was that extracts from grass containing the toxic property causing facial eczema were now being injected into rabbits and white mice and gave a more rapid indication of the toxicity than the feeding test previously used with guinea pigs.

The correct treatment of sheepskins to avoid faults which depreciate their value, modern control methods for lice and keds, the reproductive process in sheep, and the testing of inheritance of growth rate in beef cattle were described at the second demonstration point.

The need for maintenance of health in the ewe flock was stressed at the third stop, where it was pointed out that 80 per cent of ewe losses occurred during lambing and could be prevented by better management, vaccination,

Papers and Speakers

Papers were presented at the conference by speakers as follows:

"British Meat Production Methods and their Impact on the New Zealand Meat Industry"—Dr C. P. McMeekan, Superintendent, Ruakura.

"Recommended Techniques for the Hill-country Farmer"—E. A. Clarke, Senior Principal Scientific Officer, Ruakura.

"Wear in Sheep's Teeth"—Dr C. R. Barnicoat, Head of Biochemistry Department, Massey Agricultural College.

"Studies of the Dry Ewe"—Dr D. G. Edgar, Veterinary Research Officer, Ruakura.

"Breeding Romneys for Better Lambing Percentages"—Dr L. R. Wallace, Senior Principal Scientific Officer, Ruakura.

"Current Ideas on Raising the Lambing Percentage of Sheep"—I. J. Inkster, Scientific Officer, Ruakura.

"Meeting the Changing Market for Meat"—L. A. P. Sherriff, member, New Zealand Meat Producers Board.

"Lamb Losses from Birth to 6 Months"—D. C. Dodd, Veterinary Diagnostic Officer, Ruakura.

"Hormone Implants in Beef Production"—I. A. M. Lucas, Rowett Research Institute, Scotland.

"Hormone Implants in Wool Production"—Dr D. A. Ross, Wool Research Officer, New Zealand Wool Industries Research Institute.

"Crossbred Beef Production"—Miss D. E. K. Walker, Principal Scientific Officer, Ruakura.

"Common Plants Poisonous to Stock"—M. R. Coup, Senior Scientific Officer, Ruakura.

"The Control of Grass-grub with DDT"—A. V. Allo, Instructor in Agriculture, Tauranga.

"Weeds in New Pastures"—F. B. Thompson, Principal Scientific Officer, Rukuhia Soil Research Station.

"Planning Winter Feed for the Dairy Herd"—J. D. J. Scott, Instructor in Agriculture, Ruakura.

"Circulation Cleaning of the Milking Machine"—D. S. M. Phillips, Principal Scientific Officer, Ruakura.

"Meeting Changing Markets for Dairy Produce"—R. A. Candy, Chairman, New Zealand Dairy Products Marketing Commission.

"British Milk Production Methods and their Impact on the New Zealand Dairy Industry"—Dr McMeekan.

"Wintering Cows on Autumn-saved Pasture"—Dr Wallace.

"Further Studies on Strip Grazing"—Mr Lucas.

"Some Problems of the Town Milk Producer"—T. R. Ellett, farmer, Mangere.

"Some Common Misconceptions about Artificial Breeding"—Dr J. P. James, Director of Artificial Breeding, New Zealand Dairy Board.

"Dairy Cattle Fertility Investigations"—T. J. McClure, Veterinary Research Officer, Ruakura.

Many of these papers will be published in later issues of the "Journal".

Printed "Proceedings" of the conference, containing all papers and discussion, will be sent to those who paid enrolment fees and to anybody who was prevented from attending and who sends in an order (10s. per copy) promptly to the Ruakura Animal Research Station, P.B. Hamilton, or to the Department of Agriculture, P.O. Box 2298, Wellington.

correct treatment of disease, and good hygiene.

Ewes of different ages and on different feeding levels at the Hill Country Station at Whatawhata were penned at the fourth point to demonstrate results obtained in experiments to determine the lifetime effect of different planes of nutrition on ewe performance.

Early Weaning of Hill-country Calves

The advantage of early weaning of hill-country calves in allowing cows to be worked hard from January to July instead of the normal period of from April to July was discussed at the fifth point. It was stated that, though a group of late-weaned calves on show there were 30 lb. heavier than their early-weaned mates in the next pen, by the end of spring in their second year there would be no weight difference between the two groups.

At the final demonstration point for sheep farmers pens of Romney ewes at the hogget, 2-tooth, 4-tooth, and 6-tooth stages and taken from high- and low-fertility flocks were shown to help explain experiments being undertaken to breed Romneys for better lambing percentages.

Sheep farmers who wanted to inspect the Hill Country Station at Whatawhata, 15 miles from Ruakura, were conducted around the Station during the afternoon of the field day.

Influence of Ruakura

The most vivid impression left with the observer at the field day was the keen desire of the Station staff at all demonstration points to have everyone understand clearly the aim of the research projects and the lessons being learnt from them. Inquiries were prompted and encouraged and no effort was spared in elucidation.

Such a gathering as this field day is of inestimable value for the opportunity it affords of an exchange of views between the agricultural scientist and the farmer. If attendances at these conferences continue to grow in future at the rate they have in the last 9 years, the circle of farmers throughout the country who will be influenced by the teachings of Ruakura and who will implement the recommendations of the Station's research workers must be ever widening.

—*J.W.McA.*

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during May 1958 and for the 10 months ended 31 May 1958 with comparative figures for the same month and the 10 months of 1956-57 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
May 1958	3,841	129	3,970	—
May 1957	3,723	150	3,873	—
Increase or decrease	+118	—21	+97	+2.504
10 months ended 31/5/58	170,872	2,856	173,728	—
10 months ended 31/5/57	151,657	2,893	154,550	—
Increase or decrease	+19,215	—37	+19,178	+12.409

Butter in store at 31 May 1958 was 29,038 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
May 1958	4,317	524	4,841	—
May 1957	4,684	376	5,060	—
Increase or decrease	—367	+148	—219	—4.328
10 months ended 31/5/58	76,630	13,250	89,880	—
10 months ended 31/5/57	78,839	10,354	89,193	—
Increase or decrease	—2,209	+2,896	+687	+0.770

Cheese in store at 31 May 1958 was 22,908 tons.

If these figures are converted into butterfat equivalent, there is an increase of 10.007 per cent in butterfat graded for the 10 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

Meteorological Records for June

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	53.0	+ 0.9	67.8	37.4	3.18	13	— 3.90	0.96	30	120
Auckland	160	53.8	+ 0.8	65.2	37.2	1.64	16	— 3.75	0.50	24	132
Tauranga	10	50.1	+ 1.1	64.5	30.7	1.97	8	— 3.58	0.85	25	146
Ruakura	131	48.7	+ 1.2	63.6	24.1	1.66	15	— 3.12	0.74	25	115
Whakarewarewa ..	1006	46.8	+ 1.3	61.7	26.3	2.09	7	— 3.44	1.15	25	131
Gisborne	14	49.2	+ 0.4	70.0	29.7	1.11	8	— 3.10	0.64	14	186
New Plymouth ..	160	50.2	+ 0.1	58.9	35.1	5.29	15	— 0.89	1.56	24	123
Kariol	2125	42.2	+ 0.7	60.0	22.0	2.34	9	— 2.76	0.95	25	
Napier	5	49.6	+ 0.9	65.2	29.2	0.45	4	— 2.61	0.23	25	185
Wanganui	72	49.4	+ 0.6	65.7	31.0	2.12	7	— 1.27	0.76	25	136
Palmerston North ..	110	47.8	+ 0.8	64.0	27.4	2.60	11	— 1.75	0.82	25	118
Waingawa	340	45.0	— 0.4	66.0	25.0	2.03	9	— 2.06	0.56	25	172
Wellington	415	48.9	+ 1.2	59.9	35.0	3.62	6	— 1.03	1.50	24	165
Nelson airfield ..	5	44.2	+ 0.1	62.0	26.7	2.60	5	— 0.69	1.58	25	191
Blenheim	12	46.1	+ 1.2	65.3	24.3	1.82	5	— 0.66	1.04	25	203
Hokitika	15	44.6	+ 0.3	56.0	27.1	3.70	16	— 5.13	1.05	6	98
Hanmer	1270	40.8	+ 1.1	65.0	19.0	1.87	6	— 1.62	0.79	26	130
Christchurch ..	22	43.5	+ 0.3	66.5	23.6	1.84	5	— 0.75	0.87	25	148
Ashburton	323	44.1	+ 2.3	73.4	22.8	1.58	3	— 1.02	1.03	25	137
Timaru	56	43.2	+ 0.8	68.0	26.1	0.24	3	— 1.63	0.21	25	132
Alexandra	520	40.5	+ 2.8	65.8	18.8	0.45	5	— 0.34	0.22	6	124
Taieri	80	43.2	+ 1.4	68.8	27.4	1.01	14	— 1.31	0.27	6	97
Invercargill airfield ..	0	44.2	+ 2.6	64.4	28.9	3.95	25	+ 0.30	0.62	17	80
Chatham Islands ..	140	45.9	— 0.6	55.3	33.8	4.59	24	+ 0.69	0.84	15	

Complete Guide to "Journal" Since 1910

A COMPLETE guide to the mass of authoritative material that has appeared in the "Journal" since the first issue appeared in 1910 is contained in the Consolidated Indexes available from Publications Section, Box 2298, Wellington, at 10s. each. Indexes cover the periods 1910-20, 1920-30, 1930-40, and 1940-50.

If you have kept old "Journals" for years back, a Consolidated Index of them will save hours of searching for half-remembered references and will introduce new possibilities of usefulness and interest for these back copies.

Swedes as a Surface-irrigated Crop in Mid Canterbury

By B. A. LAUDER,
Instructor in Agriculture, Department of Agriculture, Ashburton

ALMOST all of the water used on the State-controlled irrigation schemes in mid Canterbury is applied to grass-clover pastures. A relatively very small area of lucerne, grown mainly for hay, is also irrigated each year. In the drier seasons crops of turnips and occasionally rape, wheat, oats, barley, peas, and swedes are also watered. Swedes are one of the most successful of the crop plants so far tried under irrigation in mid Canterbury, but up to the present only a few crops have been grown each year, the total area probably barely exceeding 100 acres annually. There are indications, however, that this area will increase considerably in the near future partly because of the unreliability of turnips as a result of the incidence of mosaic disease, but mainly because of the very satisfactory yields obtained from swedes. On the smaller farm particularly, where high production per acre may be very important, there is definitely a place for 10 to 20 acres of irrigated swedes.

THE information in this article relates strictly to the light to medium plains soils in mid Canterbury only, but it is probable that the recommendations could be applied, perhaps with some modification, to the extensive areas of these* and similar soils in other districts. On deeper and more fertile soils higher yields with less irrigation could be expected.

Soil Preparation

Preparatory cultivation for the irrigated swede crop should aim at maximum possible depth of friable soil with the turf well broken down. This is particularly important if the crop is to be ridged, because unless the soil is reasonably fine and the turf is reduced to small pieces, satisfactory consolidation is not possible, ridges are liable to dry out rapidly, and large pieces of turf readily block the coulters and result in very uneven sowing.

Time of starting cultivation depends partly on the intended time of sowing and partly on the nature of the turf. For early sowing on paddocks with a strong turf a start should be made in June or July. For late sowing where the turf is lighter starting cultivation in August or September would be satisfactory.

It is desirable to use the paddock going into swedes as a run-off during winter, as this may reduce the amount of cultivation necessary and at the same time will raise the fertility of the soil.

Time of Sowing

Swedes may be sown any time between early October and January. However, with sowings made between mid October and the end of November there is risk of severe seedling damage by brown beetle. To avoid this it is advisable to confine sowing to the first fortnight of October or the first fortnight of December. This applies especially to ridged crops, because there is much more work with these than with crops sown on the flat with the grain drill.

Though early sowing normally produces the biggest crops, there are advantages in late sowing which tend to compensate for the somewhat lower yields. First, the crop enters the winter growing vigorously and therefore keeps better. Secondly, later ploughing of the paddock is possible and it can therefore be used longer as a run-off. Thirdly, weeds are likely to be less troublesome. Fourthly, late-sown crops make no demand on irrigation water in early summer, when it may be required for pasture.

Method of Sowing

Two methods of sowing are in general use: drilling in 7 in. rows on the flat with the grain drill and sowing on 28 in. ridges with the turnip ridger, the latter being the more common. Both methods are satisfactory on border-diked paddocks, but ridging is to be preferred on ground not border diked, because it allows the crop to be furrow irrigated, giving better control of water. A further advantage of ridging is that inter-row cultivation is possible, so that even on border-diked ground it is desirable to ridge if weeds are likely to be troublesome.

The two methods of sowing, 28 in. ridges and 7 in. rows on the flat, were compared in a trial at Winchmore Irrigation Research Station during the 1953-54 season. The yields from the plots sown in 7 in. rows on the flat were equal to those from plots sown on 28 in. ridges. However, the ridged swedes seemed to be more efficiently used by stock, partly because individual bulbs were larger and partly because stock tended to walk between the rows, and bulbs therefore kept cleaner.

Though fairly satisfactory results have been obtained with 28 in. ridges, this spacing appears too wide, at least on light land, and a substantial no-cost increase in yield might be obtained by

Ewes feeding on break of irrigated ridged swedes.

---

* Lismore stony silt loam; Eyre shallow silt loam and stony silt loam.

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Cutting head-ditch for furrow irrigation of swede crop.

reducing the spacing between rows to 21 in. The question of row spacing, seeding rates, and plant distribution is worth further investigation.

Seeding Rates

The amount of seed required per acre depends on the method of sowing. Sown in 7 in. rows 10 oz. to 12 oz. of seed per acre gives sufficient density of plants. On this basis 28 in. ridges would require only 2½ oz. or 3 oz. of seed and under ideal conditions this would be the correct amount to sow. However, seedbed and sowing equipment are seldom ideal, and for average conditions 5 oz. to 7 oz. should be sown.

The seeding rate is of vital importance on ridges, because nothing can be done apart from thinning or resowing to correct any mistake. Testing the seed box before the paddock is started and checking and adjusting the rate, if necessary, as the work proceeds are therefore essential. When the crop is sown in 7 in. rows too thick a strike can be corrected with the grubber or drill and too thin a strike by sowing a few ounces of turnips or half a bushel of Italian ryegrass through the crop.

Whatever method of sowing is adopted reasonably even distribution of seed is important. If the seed box cannot be relied on, it is better to mix the seed with manure and sow through the manure box. If this is done the fertiliser must be one that will not impair germination, for example a mixture of equal parts of superphosphate and lime mixed about a week before sowing.

When the turnip ridger is used on stony ground its speed should be kept down, because otherwise uneven sowing and damage to the machine are likely to occur.

The best sowing depth is probably about ¾ in. Depth is about right if a trace of fertiliser is seen on the surface.

Choice of Variety

Six varieties of New Zealand-grown Government-approved seed are available, Superlative, Crimson King, Grandmaster, Sensation, Calder, and Wilhelmsburger. All are capable of good yields in suitably moist seasons, but such seasons are rare and it is therefore wise to choose a variety adapted to the harder conditions which usually prevail.

The main characteristics required are resistance to aphids, mosaic, and dry rot and soft rots, good palatability, and good keeping quality. Calder, Sensation, and Wilhelmsburger possess these characteristics in greater measure than the other varieties available.

In keeping quality and resistance to rotting, Calder has been superior to Sensation and Wilhelmsburger in trials at the Department of Agriculture's Winchmore Irrigation Research Station and on a paddock scale in the district. Therefore it is considered the best of these varieties, especially if the crop is required for late feeding.

Manurial Requirements

Lack of soil moisture, the chief factor limiting swede yields in most seasons, can be partly eliminated with irrigation. Shortage of nutrients then becomes the main factor limiting growth. Thus fairly heavy rates of application of fertiliser are justified for swedes which can be adequately irrigated.

Borax

Swedes are subject to the disease mottled heart caused by boron deficiency. This is fairly widespread in the soils of mid Canterbury and should be corrected by broadcasting 15 lb. to 20 lb. of borax per acre before drilling. It is convenient to mix the borax with 1 cwt. of lime to give sufficient bulk for spreading. If it is desired to apply additional superphosphate to the paddock, the borax could be mixed with this instead of lime.

Superphosphate

Swedes are particularly responsive to superphosphate. As there is some risk of germination injury if too much superphosphate is sown with the seed, especially in dry soil, a mixture of equal parts of superphosphate and lime is preferable if more than 1 cwt. per acre of superphosphate is sown. An alternative is to use reverted superphosphate, though the mixture is better.

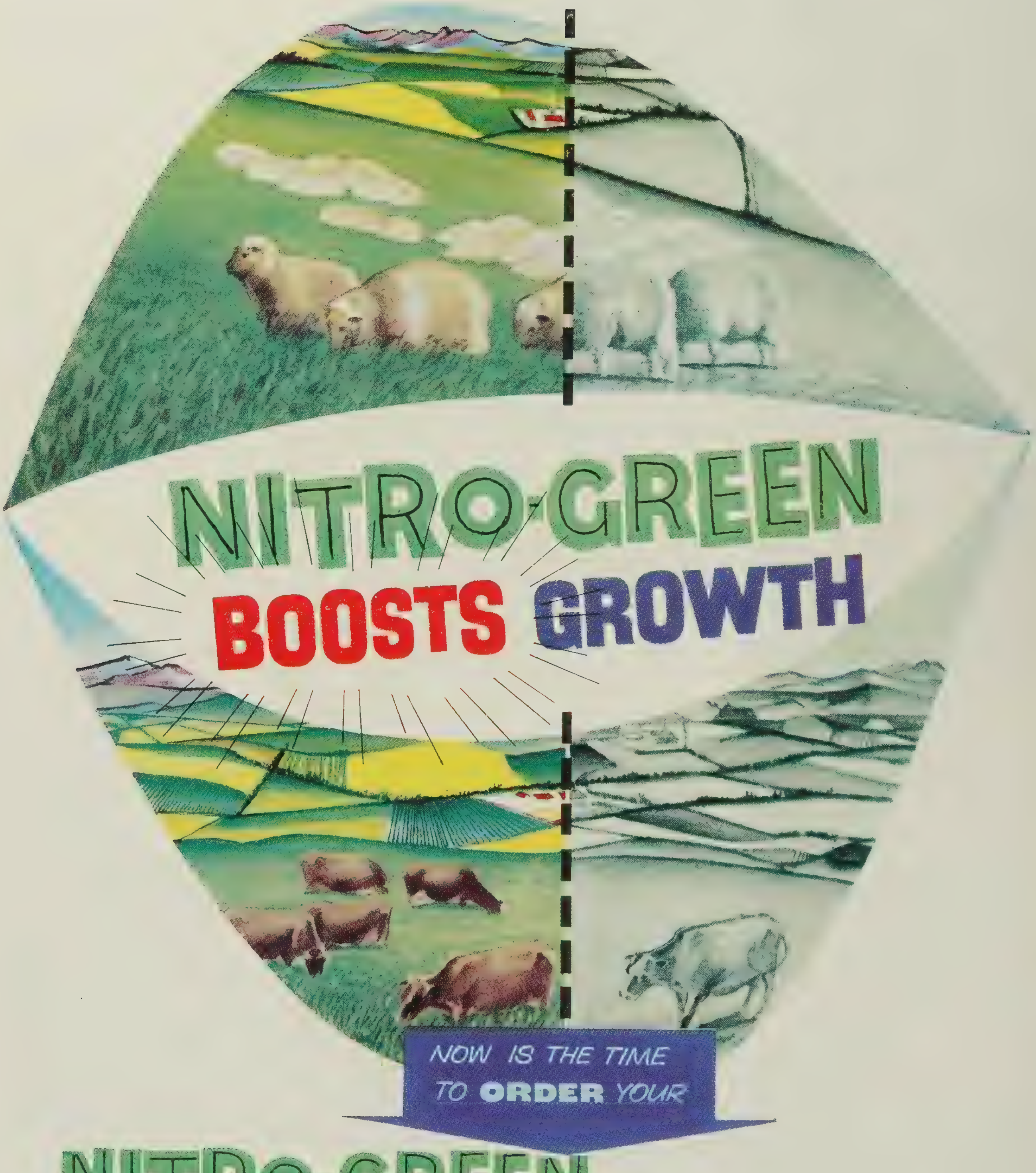
For crops sown in 7 in. rows 3 cwt. per acre of the superphosphate-lime mixture should be sown with the seed. Drilling a further 1 cwt. per acre of superphosphate through the crop may be worth while.

For ridged crops 2 cwt. per acre of the superphosphate-lime mixture should be sown with the seed and 2 cwt. of superphosphate below the seed.

When the crop is ridged borated superphosphate may be used in place of straight superphosphate below the seed to obviate separate application of borax.

Other Fertilisers

When, as is usual, swedes are the first crop after pasture there is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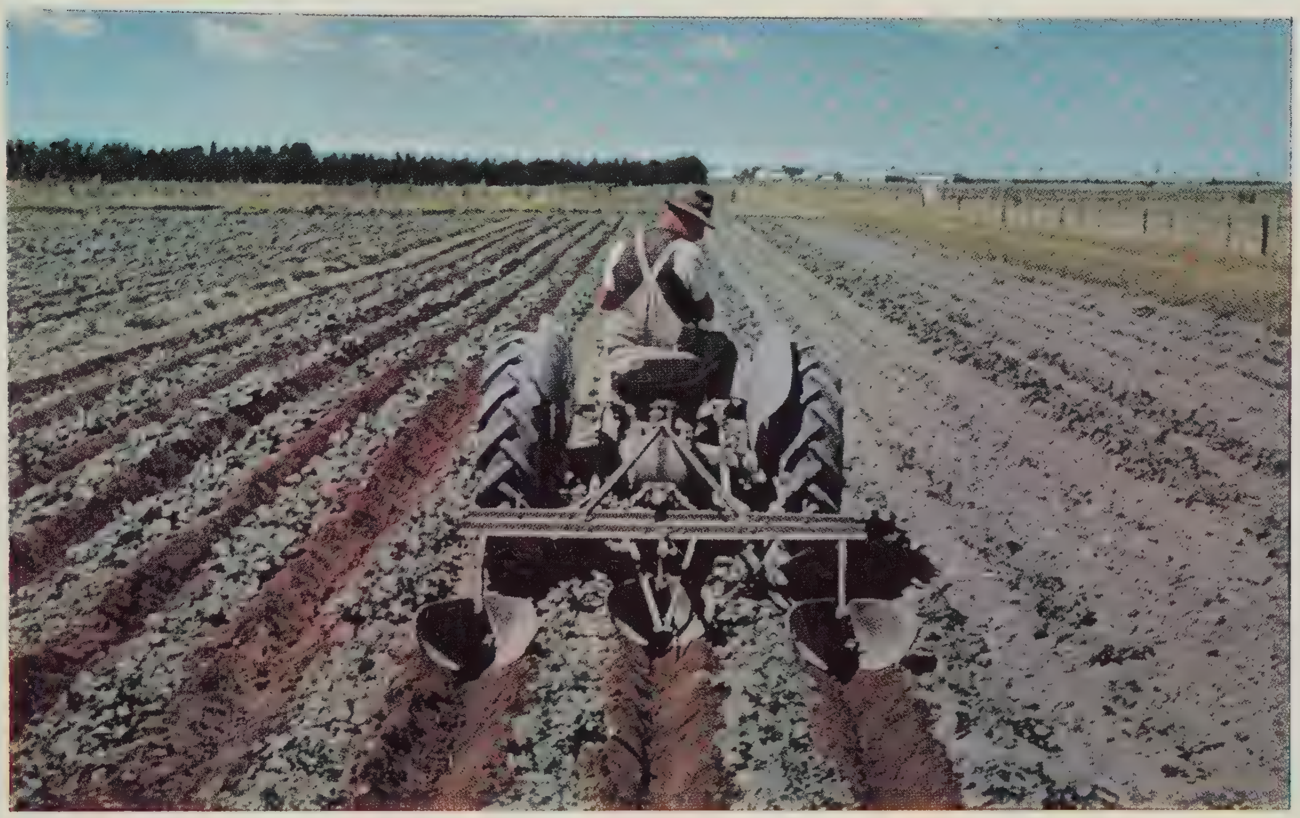

Deepening furrows with double moulder before irrigation.

normally no need to apply either potash or nitrogen, since there is a build-up of these nutrients while the land is under pasture, especially if the paddock has been used as a run-off.

In a fairly comprehensive manurial trial carried out at Winchmore during the 1955-56 season various rates of superphosphate and single high rates of sulphate of ammonia and muriate of potash were tested under high and low levels of irrigation. In this trial satisfactory yields clearly depended on adequate superphosphate as well as adequate irrigation. Neither sulphate of ammonia nor muriate of potash increased the yield of bulbs.

Responses to increasing rates of superphosphate depended on increased intensity of irrigation. In practice this means that if the crop is to be allowed to reach permanent wilting point before being irrigated, only 1 cwt. to 2 cwt. per acre of superphosphate is justified. If the moisture level in the soil can be kept above wilting point, the amount of superphosphate should be increased to 2 cwt. to 3 cwt. per acre.

Irrigation Methods

The method of irrigation employed depends on the method of sowing, contour of paddock, and labour and equipment available. The frequency of irrigation depends largely on the amount and distribution of rainfall during the growing season and on labour and water available. Complete coverage of the paddock is usually impossible, irrespective of the method of irrigation. For example, on border-diked paddocks it is difficult to irrigate the dikes themselves without using an excessive amount of water and labour. It is probably better to ignore these parts, even though they may be up to 10 per cent of the area of the paddock and contain the most fertile soil.

The use of a land leveller during seedbed preparation helps to smooth out minor high spots and hollows, thereby improving coverage.

Optimum length of run—distance from head-ditch to bottom of paddock—has not been determined experimentally, but observation suggests that, irrespective of method of irrigation, it should not exceed 5 or 6 chains. If the distance is greater, grossly excessive amounts of water are likely to be applied.

The four main methods of surface irrigation of the swede crop are briefly as follows:

1. Ridged Crops on Border-diked Paddocks

The ideal way is to furrow irrigate, using spiles set in the head-ditch bank or siphons over it. In either case the head-gates have to be sealed with boards and earth if the existing head-ditch is to be used. It is also necessary to continue the furrows right up to the head-ditch by hand.

Many head-ditches are unsuitable for use with either spiles or siphons, and it is often preferable to cut a temporary ditch after the crop is established. This reduces hand work considerably, though some shovelling may be necessary to clean out the first few feet of the furrows. The use of spiles or siphons gives almost perfect control of water, reduces the depth of water applied to a minimum, and makes alternate furrow irrigation feasible.

Where siphons are to be used with an existing head-ditch a "regulation bay" is usually needed. This is constructed by throwing up a dike across the check a few yards from the head-ditch, thereby forming a small reservoir from which the siphons draw water.

2. Ridged Crops on Non-border-diked Paddocks

Probably the most satisfactory way to grow irrigated swedes on non-border-diked paddocks is to ridge them. The direction of ridging should correspond with the greatest fall,

Scabby Mouth

Vaccination

On farms where scabby mouth occurs, each new crop of lambs should be vaccinated, and this is most conveniently done at marking. If lambs are not protected they are liable to suffer a severe check as the disease makes eating very painful. Ewes which have not previously been exposed to the disease should be vaccinated at the same time as the lambs.

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usually ½ in. to 1 in. per chain. The head-ditch is not cut until the crop is out of the seed-leaf. Satisfactory ditches can be cut with a tractor fitted with a grader blade and they should run slightly off the contour with a fall of 1 in. or 2 in. per chain. The crop can be irrigated by spiles, siphons, or notches cut in the ditch bank.

3. Crops Sown in 7 in. Rows on the Flat on Border-diked Paddocks

It is usual to drill the crop across the dikes, not parallel with them. Having the rows running across the path of the water seems to help in obtaining a better spread. There is, of course, no possibility of furrow irrigation with crops sown in this way. Sometimes there is enough side slope on certain checks to cause the water coming through the head-gate to run to one side; a piece of 8 in. x 1 in. board about 8 ft. long may help to deflect it. Frequently certain checks tend to be slightly dished and the water has a tendency to run down the centre. To obtain a better spread two boards formed into a V can be used.

4. Crops Sown in 7 in. Rows on the Flat on Non-border-diked Paddocks

Unless the paddock is particularly smooth this method should be avoided, if possible, because it allows only relatively poor control of irrigation water. The usual result is overwatering of gullies and other low spots, with consequent damage to the crop, and poor coverage of ridges and high spots. With this method (wild flooding) the rate of watering may be very slow and excessive amounts of water may be applied. These disadvantages can be minimised by judicious placing of ditches along the ridges.

Rate of Irrigation

With furrow-irrigated ridged crops using a flow of 8 cusecs it is possible to cover up to 2 acres per hour. This is equivalent to an application of 4 in. depth of water. When the crop is flooded, however, it is not usual to do more than ⅔ to 1 acre per hour, which is equivalent to an application of 12 in. to 8 in. depth of water. Lismore stony silt loam will hold only about 2⅓ in. of available water per foot of depth. Assuming soil depth to be 18 in., anything over about 3½ in. is wasted by run-off or percolation into the underlying shingle.

If a flow of 8 cusecs is used, irrigation of swedes is a 2-man job, irrespective of the method used. One man cannot normally handle more than 3 to 4 cusecs efficiently.

Intensity of Irrigation

Intensity of irrigation is specified by frequency and amount per application. Little control can be exercised over the water applied, apart from choosing as efficient a method as possible, for example, alternate furrow irrigation. Frequency of irrigation is decided by the apparent needs of the crop and moisture content of the soil, within the limits of labour and water available.

A well ridged swede crop which will be furrow irrigated.

Pre-irrigation

Pre-irrigation means irrigating the paddock before the crop is sown. It is not normally necesssary and should be avoided, if possible, since extra cultivation is entailed and there is some danger of excessive leaching of available nitrogen when heavy applications of water are used. However, if the soil is too dry to ensure a satisfactory strike and good early growth, the paddock should be pre-irrigated.

The ground must be well consolidated, as otherwise it may be impossible to get water to the bottom of the paddock. After irrigation the land should be cultivated as soon as the soil is in fit condition, with the aim of producing a surface mulch to reduce loss of moisture by evaporation.

First Irrigation

Too early irrigation may permanently damage the seedling plants, but if water is withheld too long, growth may be arrested, even after water is applied. In either case the yield may be considerably reduced.

Watering should be delayed as long as possible, at least until plants have five or six true leaves, which is usually 4 to 6 weeks after sowing. The ground should be reasonably well covered by this time, and if the crop is to be flooded, the danger of crust formation and cracking of the soil surface is reduced.

The chance of damaging the crop by too early irrigation is much less with furrow-irrigated crops. However, a light intercultivation is advisable as soon as possible after watering.

Subsequent Irrigation

The number of irrigations required depends mainly on rainfall during the growing season. On the average, two or three irrigations are necessary for production of satisfactory swede yields.

The crop should be irrigated according to the moisture content of the soil, and ideally some accurate method of measuring soil moisture should be used. A portable device suitable for the purpose is available for about £40.

It is usual to decide on when to irrigate according to the apparent moisture status of the soil and the appearance of the crop. Water should be applied when plants are approaching the condition of "permanent wilting". This condition is characterised by a rather dull green colour in the foliage and loss of turgidity of older leaves. Recovery of plants near permanent wilting point does not occur unless the moisture content of the plant is increased, either by rain or irrigation, and if this does not take place, the lower leaves die prematurely and fall off.

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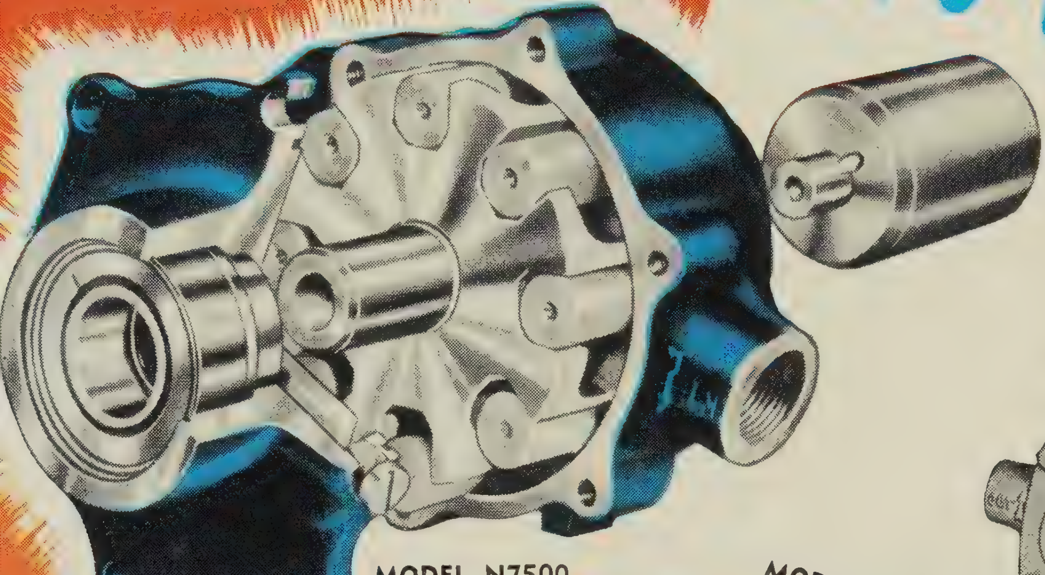

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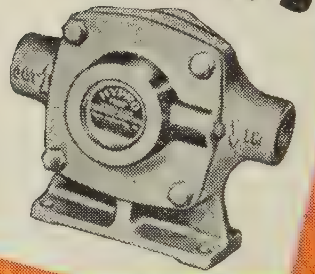

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Permanent wilting should not be confused with temporary wilting, which may occur on hot days, even when the soil is quite moist. Plants recover unharmed immediately the heat of the day is over. If the crop is to be supplied with sufficient water for a satisfactory yield, with minimum use of irrigation, frequent inspection of both plants and soil is necessary, because in norwester weather in mid Canterbury the soil may dry out from maximum moisture-holding capacity to wilting point within a fortnight.

A fairly wide range of irrigation treatments has been used in swede trials at Winchmore over the past 6 years. Some treatments have consisted of irrigating on the basis of visual estimates of the needs of the crop (the method normally employed by farmers) and in some trials soil moisture has been determined by sampling and used as a guide as to the time to irrigate.

From trials at Winchmore it appears that irrigating when three-quarters of the available soil moisture has been used up is not only reasonably efficient, but supplies sufficient moisture for good yields up to 30 tons per acre. For Lismore stony silt loam the moisture content corresponding to the point where three-quarters of the available moisture has been lost is about 15 per cent. The appropriate moisture content for other soils will probably be somewhat different and will depend mainly on their clay content.

SWEDES AS SURFACE-IRRIGATED CROP

Two-inch plastic siphons being used for furrow irrigation of swede crop.

Yields and Use

The high feeding value of swedes is generally recognised and all classes of sheep and cattle appear to winter well on them. However, sheep must have sound teeth if they are to use swedes satisfactorily, so that on farms where the flock consists of ewes with badly worn teeth swedes are not a satisfactory substitute for turnips.

The dry-matter content of swedes is 11 to 12 per cent compared with 8 to 9 per cent for white-fleshed turnips, and the digestible-protein content of swedes is almost double that of white-fleshed turnips. Thus, ton for ton, swedes have a feeding value at least 50 per cent higher than that of white-fleshed turnips. Taking yields into account, 1 acre of swedes is equal to 1½ to 2 acres of white-fleshed turnips.

Yields of irrigated swedes in mid Canterbury range from 15 to 30 tons per acre, depending on suitability of the paddock, the season, and the cultural methods adopted. The average yield is about 20 tons. It has been found that 1 acre of a 30-ton crop supplemented with hay fed at ½ lb. per head per day will winter 80 to 100 ewes. Fifteen acres of a fairly good crop (20 tons) supplemented with hay would winter 1,000 ewes.

With hay and autumn-saved pasture the irrigated swede crop may provide the basis for substantial increases in the carrying capacity of irrigated farms. There are indications of increasing interest in swedes as an irrigated crop in mid Canterbury and it is quite possible that within a few years up to 1,000 acres may be grown annually.

Farmers' Results

To illustrate the carrying capacity of irrigated swedes the amount of feeding obtained from some typical crops grown in mid Canterbury during the 1956-57 season are quoted. Yields were estimated by weighing random samples of the crops shortly before feeding began. In all cases the swedes were supplemented with hay, the general level of feeding being 1 bale per 100 ewes daily.

Area A: 10 acres **Estimated yield:** 20 tons per acre
1,100 ewes from 15 June to 15 July
500 hoggets from 15 June to 3 July

Area B: 12 acres **Estimated yield:** 24 tons per acre
1,100 ewes from 15 July to 5 August
500 hoggets from 3 to 24 July
340 wethers from 5 July to 20 August

Area C: 14 acres **Estimated yield:** 28 tons per acre
1,800 2-tooth wethers from 29 June to 7 August

Area D: 23 acres **Estimated yield:** 17 tons per acre
1,300 ewes from 12 June to 29 July
345 hoggets from 1 to 21 August
1,800 2-tooth wethers from 1 to 15 August
(Crop contained about 5 per cent of chou moellier)

Area E: 8 acres **Estimated yield:** 28 tons per acre
930 ewes from 12 June to 12 August
120 hoggets from 12 June to 12 August
40 calves for 6 weeks

Area F: 16 acres **Estimated yield:** 16 tons per acre
200 hoggets from 2 to 17 June
800 ewes from 17 June to 20 July
65 yearling cattle from 17 June to 15 September

(Crop contained about 30 per cent of chou moellier)

British Farmers' Effective Competition with N.Z. Dairy Producer

THE competition New Zealand is now facing from the British farmer as a result of greatly increased agricultural production in Britain was stressed by Dr C. P. McMeekan, Superintendent of the Department of Agriculture's Ruakura Animal Research Station, in two papers about British farming methods which he gave at this year's Ruakura Farmers' Conference Week. The second of these papers, dealing with the impact of British milk production methods on the New Zealand dairy industry, is set out below; the other paper, about British meat production, appears on page 90.

CERTAIN aspects of modern British agriculture must be borne in mind for a reasonable understanding of the British scene and its consequential impacts on us as dairymen. Those with particular application are:

1. British agriculture has been revamped and revitalised during the last 20 years, so that today it bears little resemblance to the depressed industry of prewar days.

2. Total productivity has gone up by 63 per cent and gross net profitability by over 600 per cent; total value of output has risen to £1½ thousand million (sterling).

3. Milk production has increased by 830 million gallons—equivalent to an extra 1½ million cows with the production level of our New Zealand herd.

4. Triggered off by war, this transformation has been maintained and is continuing in consequence of three main forces—the political climate, the subsidy system, and a high average quality of British farmers.

5. There are no reasons to expect any significant change in the present production picture or trends, since these three stimulating factors continue to operate and since all prices are guaranteed 4 years ahead.

From these facts we need wonder no longer that the British milk producer has become an effective competitor to the New Zealand dairy farmer for the first time in history. It is true that increased supplies of milk products from other countries, some of which are not traditional exporters to Britain, have contributed to the recent drastic fall in butter prices. It is true, perhaps, that removal of part or all of the butter from these heavily subsidised exporters would effect some recovery in the price of this commodity, but we must appreciate fully that it is the surplus home production that is the major cause of our troubles. Such a conclusion is especially true of cheese.

Let us look at some of the facts. Prewar British farmers produced 1½ thousand million gallons of milk, of which 400 million gallons were used in manufacture. This year they will produce nearly 2½ thousand million gallons, of which over 700 million gallons will be manufactured. The quantity manufactured fell to a low level during the 10 years 1940 to 1950, when it averaged a little more than 100 million gallons a year. Over the last 8 years alone therefore the manufacturing surplus has increased more than six times. The current surplus is estimated to produce 130,000 tons of cheese, 40,000 tons of butter, 120,000 tons of milk powder, 200,000 tons of condensed milk, and 20,000 tons of cream.

If it is remembered that New Zealand manufactures only about a thousand million gallons of milk a year, then United Kingdom farmers now have a surplus seven-tenths as large. A few years ago this was only one-tenth of our figure. Thus even if we are successful in persuading the British authorities to exclude supplies of butter from heavily subsidised countries, the relief so obtained could be transitory. Production in England is still going up despite the new lower guaranteed price. Let us have a look at some of the major features of British dairy farming responsible for this situation.

Price Supports

Milk, like meat, is also strongly affected by the price support policy. I was very intrigued at the reaction of an aggressive and delightful Welsh gentleman to my comment that I would not mind swapping our climate for his subsidies. Stopping abruptly in a snow-covered field and drawing himself up, he exploded: "Sir, I will have you know that there are no subsidies on milk in Britain. Any assistance is consumer aid, not farmer aid." A stream of Lloyd Georgian oratory reinforced by flowing locks and outflung beard supplemented his opinion.

It is a viewpoint, of course, which is widely held in Britain, since the price of milk to the consumer, less costs of distribution, is substantially the same as its price to the farmer. However, milk does carry a direct subsidy from Government sources which will amount to £13 million in the current year. In 1950 this figure was £73 million. The Government also purchases milk for its school and welfare schemes with grants totalling £40 million. Logically this must be added.

Since almost every dairyman reseeds his pastures to maintain temporary leys, he receives regularly the ploughing-up subsidy of £7 to £12 per acre over a substantial area of the farm. Since all use fertilisers, the

▼ On a dairy farm in Surrey, southern England.

heavy contribution of from £6 15s. to £10 per ton toward the price of these items reduces production costs substantially. Concentrate foods are specially subsidised; even home-grown grain used in dairy cattle feeding carries the 40 per cent or higher subsidy according to the type of grain involved.

An extremely valuable contribution to the cost of milk production is the price support on beef. This affects not merely the value of the cull cow, putting it in the £60 to £70 per head class, but considerably enhances the value of surplus calves. All calves command higher prices than otherwise would be the case. Both steer and heifer calves by beef-type bulls are sold at from £13 to £20 per head at birth for rearing and fattening. For the same reason a similar price is paid for pure Friesian and Shorthorn steer calves.

Then again, dairymen have participated and continue to participate in the worthwhile advances made in respect to the cost of permanent improvements on farms. Farm drainage and water supply schemes and housing and farm building construction and renovation all carry substantial grants.

Of special significance to the dairyman is the grant for silo construction of up to £250 each. Relatively recent in origin, this scheme resulted in over 13,500 silo projects being approved for grants up to the end of 1957. The cost in State aid totalled £2 million. With new developments in the field of silage utilisation referred to later, increasing use is likely to be made of this form of production assistance.

The general structure of British dairying, like meat production, is such that a large proportion of producers also enjoy the other farming supports. Most collect subsidies on their production of grain, pigs, and eggs; many participate in the support prices for lambs and wool; others cash in on sugar beet and potatoes. More recently separated milk at prices much below cost is supplied by the Milk Marketing Board for pig feeding.

While it is not possible to estimate the precise amount of the assistance obtained by dairymen directly or indirectly toward their costs of milk production, I believe this to be conservatively estimated at from £70 to £80 million a year or approximately 10d. to 1s. per gallon.* The new guaranteed price is 3s. 1d. per gallon. It might be noted that this estimate for dairying ties in with the fact that overall profitability of farming is approximately equal to the overall subsidy assistance, profit on milk being about 10d. to 1s. per gallon.

Milk Marketing Board

Dairying is controlled by the Milk Marketing Board, established by the Agriculture Act of 1937. This is a unique organisation in that every producer of milk in Britain sells his milk to it and receives payment from it and under the terms of the Act the board is compelled to purchase at the official guaranteed price every gallon of milk produced.

The board is an extremely powerful force. It controls the distribution and sale of liquid milk and has developed its own manufacturing facilities in zones where the milk surplus is greatest. It equalises the payment between manufacturing and liquid milk. It controls herd recording and artificial breeding, and an advisory service represents milk producers in all Government price negotiations. Its annual turnover is in excess of £300 million (sterling).

Artificial Breeding

British dairy cattle have undergone dramatic changes in breed composition in recent years. Owing to the importance of liquid milk Friesians and Ayrshires have replaced Shorthorns in large numbers. This trend has been accelerated by the widespread use of artificial breeding. With over 160,000 members more than 10 million cattle have been bred in this way during the last 13 years in England and Wales alone. The movement is also extensive in Scotland and Northern Ireland. The rate of expansion has been phenomenal. Only 2,500 cattle were inseminated from Milk Marketing Board centres in 1945. By 1957 the number rose to 1.4 million.

Approximately half the total dairy herd of 4 million head are being bred in this way today.

The small average herd size of about 17 cows has assisted this technique through replacement of bulls on the farm. Initially the bulls used were merely selected pedigrees; today the large proportion are progeny tested. In principle the method of proving bulls is not dissimilar from ours. It is based on the performance of the large numbers of daughters of A.I. bulls in different herds compared with the performance of contemporary daughters, daughters of the same age by different bulls in the same herds at the same time.

With this improvement in the quality of bulls used, British dairymen confidently look for material gains in the dairy merit of their future cattle. If attained, this could still further increase productivity. Per cow production has increased considerably, being over 100 gallons better than prewar. Most of this increase to date is considered due to breed change and better feeding and management rather than to breed improvement. A.I. shows a large annual profit of over £300,000. This is credited to the Milk Marketing Board's general account and used to subsidise herd recording.

Crossbred Beef

Three years ago 300,000 dairy cows, and this year ½ million, were mated to bulls of beef breeds to produce colour-marked calves. The Hereford, Aberdeen Angus, and Shorthorn were the most used breeds. The Milk Marketing Board artificial breeding centres maintained 75 Hereford, 62 Aberdeen, 27 Shorthorn, and 17 Devon for this work.

The high average price of the crossbred calves bred in this way has been noted. Those for Friesian and Shorthorn cows command the top figures. Both sexes of colour-marked calves are fattened. Even the surplus dairy-type calves, particularly of the Friesian and Shorthorn breed, are also carried on for veal or beef. Some dairymen sell at birth, some rear to weaning stage to sell to fatteners, and some carry crossbred calves through to finished beef of 500 lb. carcass weight or more. Many individual farmers specialise in buying in such calves, rearing under multiple suckling or hand feeding, and selling after the first winter as forward stores for subsequent grass fattening. Multiple suckling is common, 6 to 8 calves being reared per cow according to the system used. The seasonality in the supply of calves helps this technique considerably. When hand rearing is practised practically all use milk substitutes rather than milk after weaning at 7 to 10 days of age.

Summing up the situation, it is clear that this planned and systematic use of beef bulls on those cows in the herd not needed to breed herd replacements is a new and significant factor in British dairy farming.

Pastures in Dairying

Most dramatic of all changes is the rediscovery by British farmers that milk can be produced from grass. I am not being facetious. Prewar a large proportion of British farmers had developed the habit of producing milk from cheap imported foodstuffs obtainable so easily by the mere use of a telephone and a cheque book. Wartime pressures forced a virtual revolution in British farming as a whole and particularly in respect to grass production and use. Today most of the milk of the United Kingdom comes from grass and grass products.

The general idea now is that pasture can provide maintenance plus 2 gallons of milk per cow per day, so that concentrates are fed only when yields above this level are sought.

It was somewhat strange to find that most pastures used in dairying were temporary leys, handled so as to fit into the arable rotation and to qualify

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*Based on cost of direct subsidy, school and welfare milk, and one-fifth of production grants.

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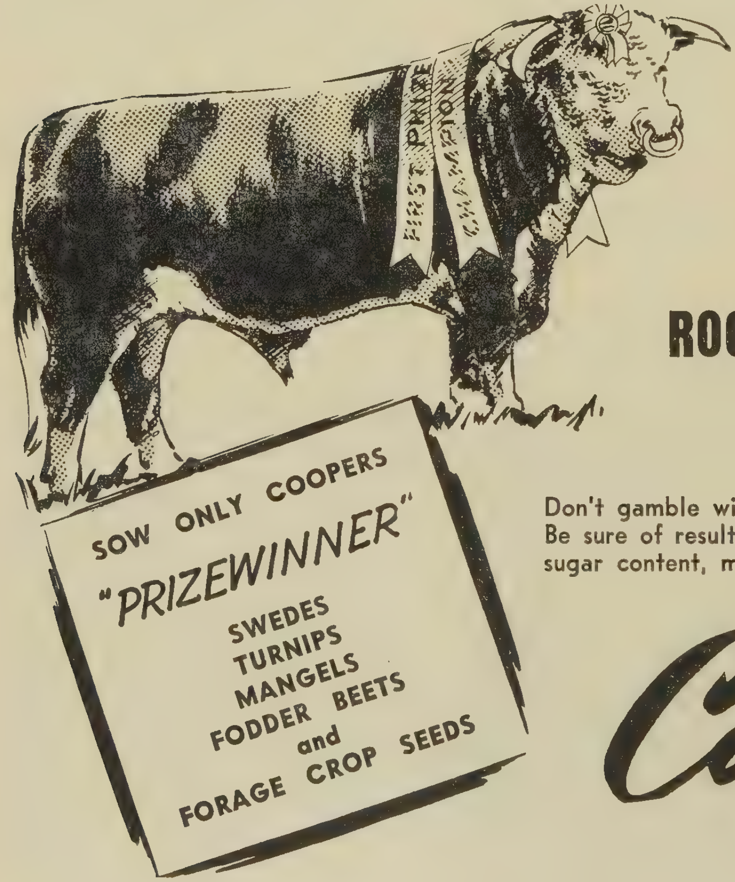

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for the ploughing subsidy paid in respect to all swards reseeded after 3 years. Permanent grass as we know it virtually does not exist except in traditional fattening areas. Italian ryegrass, New Zealand short-rotation ryegrass, timothy-meadow fescue combinations, and cocksfoot-lucerne are the most common types used. Stimulated by at least two dressings of nitrogen and one complete fertiliser application annually the yields are about 6,000 lb. of dry matter per acre.

Clovers tend to be neglected in favour of high grass yields from artificial nitrogen, the general view being that clover growth starts too late and finishes too early to contribute sufficient nitrogen for heavy production. Where clovers are used New Zealand wild white is a common type. It must be remembered the growing season is only 5 to 7 months and hours of sunshine are only approximately half ours.

Cows go to grass in spring and remain out until autumn. Pasture utilisation is based almost exclusively on the use of the electric fence, a technique borrowed from this country. Its use fits well into the farming pattern, since it gives all the advantages of controlled grazing and utilisation possible only under close subdivision, with the very real additional advantage that large-scale fields necessary for economic cultivation are retained. Research is extending the growing season of pasture at both ends and making possible ever-increasing reliance on grassland. We have nothing to teach the English farmer in his handling of this type of grassland. Perhaps we have something to learn from his exploitation of the high productivity of the short-term, special-purpose ley.

Fodder Conservation and Utilisation

To reduce dependence on concentrates, both home grown and imported, a marked extension of silage making has occurred. Virtually unknown 20 years ago except as a material recommended by academic scientists, grass silage has become a standard fodder on most dairy farms. Making is highly mechanised, British ingenuity in this connection having given us the buck-rake and forage harvester. Current developments of several new types of forage harvester machines to speed up the rate and reduce the labour of silage making are well worth watching.

The new flail-type machines, though still in the Mark 1 stage, appear likely to provide the one-man dairy farmer with an extremely effective and economic way of handling what is still one of the heaviest jobs on our dairy farms. Silos of the tower and pit type have given way almost completely to above ground clamps to facilitate filling, consolidation, drainage, and utilisation. This was of special interest to me, since not even their scientists would listen to my advocacy of such methods in 1936-38.

It is in the field of utilisation that the British farmer has made most progress. To see his silage self-feeding systems in action was a revelation. If no other good comes from my visit than that I should stimulate the interest of New Zealand dairymen in the potentials of self-fed silage, my visit will have been worth while. Though considerable modification will be required to adapt the idea to our conditions, I have sufficient faith in the ingenuity of New Zealand dairymen to believe that they will find practical ways and means of using self-feeding here. Success would mean that the biggest remaining headache in silage—that of feeding out—would be no more. If we can devise ways and means of persuading the cows to do the work for us, the all-over efficiency of both dairy cattle and beef cattle production in this country will be stepped up to a worthwhile degree; particularly will it make easier beef production on dairy and fattening farms.

Concentrate Feeding

The precise and proper place of concentrate feeding of dairy cattle is still a matter of debate among dairymen. Apart from academic arguments as to whether the standard allowance of 4 lb. of concentrates per gallon of milk is adequate or the long-established maintenance allowance too high or too low, considerable differences of opinion exist on the economics of concentrate feeding. One school of grassland enthusiasts claim milk can be produced most cheaply on grass, silage, and hay plus limited forage crops of the kale type despite climatic limitations.

This school is prepared to sacrifice per cow yields for high per acre, per labour unit, and per feed cost return. On the whole these dairymen tend to be owners of large units. At the other end of the scale are the very small producers with 10 to 20 cows as the main farm enterprise. These claim that they must have maximum per cow yields for survival and that these are obtainable only by the use of supplementary concentrates.

Probably the truth in terms of most efficient production lies somewhere between the two. Of some interest in this connection is a recent survey of 1,000-odd farms by the Milk Marketing Board. Rated in groups according to the concentrates fed per gallon of from 1 to 2 lb. to 6 lb. and over, the average per cow yield in six such groups was closely similar. At the extremes 90 farms using concentrates at the average rate of 1.8 lb. per gallon had a yield of 26.6 lb. of milk per cow for the season; 67 farms using 7.3 lb. of concentrates per gallon had exactly the same yield. The first farmers fed an average of 4.9 lb. per cow and the latter 19.3 lb.

This type of information is creating widespread interest. Many farmers are showing that 800-, 900-, and even 1,000-gallon herds can be developed on pasture, silage, hay, and kale with an average use of as little as 1 lb. of concentrates per gallon over the total yield.

The importance of this subject to us lies in the possibility that new thoughts on it are likely to lead to cheaper milk from British farmers, a smaller loss on the manufactured surplus, and in consequence a still greater surplus for this purpose in future.

Milking Methods

Though outstandingly better than years ago, when most cows were milked by hand, British machine milking still has a long way to go, and in particular still uses far too much labour. Undoubtedly milking techniques can and will be streamlined in future. Better machines, the introduction of circulation cleaning, the development of automatic recording of individual cow yields, and the use of releaser plants will alter the level of milking efficiency in the not too distant future with consequent effects on costs. Farm labour at 30s. a week 20 years ago could be ineffectually used without great harm to production costs; farm labour today at 150s. a week must be used efficiently. Labour is estimated to account for nearly a third of all dairying costs. British farmers are fully aware that they can reduce costs in many directions, particularly by better use of their labour force.

The Future

It is not difficult to be reasonably sure of the general trends likely in future British milk production. Because of the large number of small producers whose welfare for social and political reasons must be guarded by the State, because of the provisions of the Act controlling the Milk Marketing Board, which insists that it purchase all milk produced, because of the political climate re subsidies, and because of the overall high cash returns from dairy cattle relative to alternative products, no significant reduction in dairy output can be expected.

It is true that the Government in an effort to stem the rate of milk increase has just reduced the guaranteed price by 1d. per gallon. Relative to total returns and with the current drop in the world prices of feeding stuffs, together with the scope for increased efficiency, this is not likely to have any great influence on the production pattern. Rather, the small producers particularly are likely to put on more cows or to increase per cow output to compensate for a lowered gross income. I found this to be the considered view of most farmers and officials with

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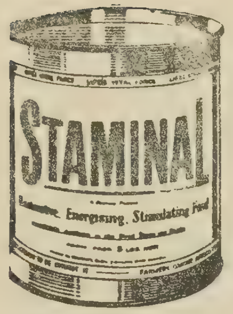
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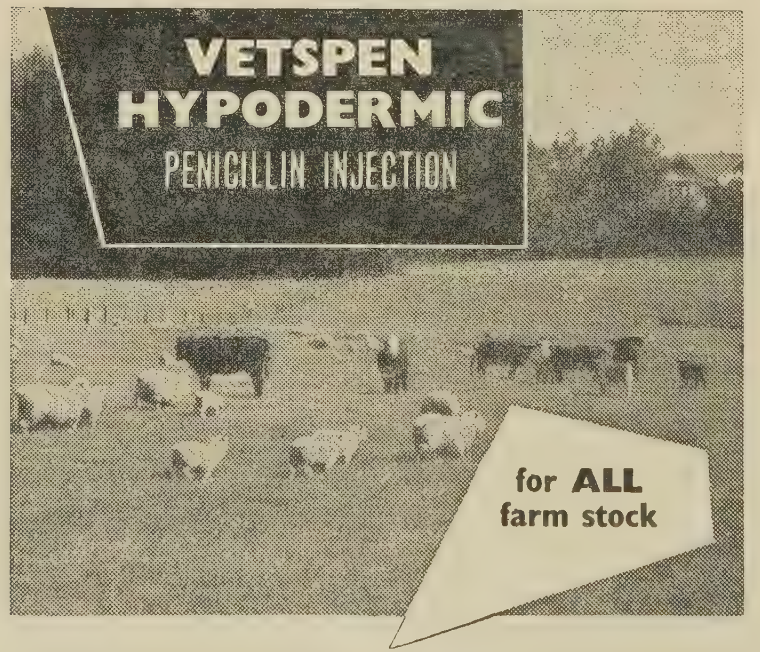
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whom I was able to talk. For example, the Milk Marketing Board predicts that it will have to handle an additional 30 million gallons this year despite the lowered price. This amount will offset half the reduced gross income.

At the same time the danger signal has been given to farmers. Most farming leaders agree that in general producers will follow the Government lead in the direction of more beef and lamb rather than more milk in the years that lie ahead. If they do, the rapid rate of expansion characteristic of the dairy industry of recent years can be expected to slow down materially and eventually to stabilise at somewhere not far from the current figure. All agree, too, that a major effort will be put into cheapening costs during this consolidation period.

All this, of course, is cold comfort to us. Whether we like it or not, I believe that we are forced into the position of recognising that the British market can take no longer an ever-increasing supply of dairy products from us unless we are prepared to come down to a price level completely at variance with our own cost structure. Obviously, it would be sensible for our own welfare, the welfare of the British farmer, and the welfare of the other traditional British-market suppliers to try to hold our exports to Britain at a level which will guarantee a reasonable return to all.

If this be true, it is obvious that the further expansion of dairying in this country must depend on alternative markets, and on increased local consumption as our own population grows. Unfortunately both these involve fairly long-term considerations and do not appear likely to be of much assistance in our immediate problem of compensating for the threatened lowered income from dairying. What can be done to alleviate this situation?

In programming of our activities in the next few years I believe it important that serious consideration be given to several possibilities. Briefly these are:

1. Continuing pressure on Britain for limitation of supplies of butter from subsidised countries to levels likely to hold the price at about the 2s. 6d. mark. I feel very certain, despite the fact that the British Government was not able to meet fully our official requests along these lines, that all sections of the British public are so favourably disposed toward New Zealand and to our dairy problem in particular that continued pressure on a Government to Government basis will be successful eventually.
2. Getting behind our Dairy Board and Marketing Commission in their efforts to locate and exploit alternative markets; seeing that adequate funds for this purpose are provided and insisting that their activities in this direction are stepped up. If Denmark, Belgium, Switzerland, and France can sell cheese right throughout the United States even into California, we should be able to do the same; every ton turned off the British market should help lift the price level of our bulk supply.
3. Taking positive action to improve the quality of our cheese output. It was a humiliating experience to find that of 30 varieties of cheeses of different origins exhibited for sale by a prominent chain store organisation in its London shop New Zealand Cheddar was the cheapest. This experience was repeated throughout Britain. It was even more humiliating to try to eat some of the stuff. Something has happened to our cheese; its quality is poor. It must be improved.
4. Meeting the Continental and Canadian demand for older bobby-calf meat by using milk to add the necessary days and weight to calves to make this product not only once more acceptable but greater in value; reorganising our bobby-calf industry to this end.
5. Reorganising rapidly to the ½ million pig level our prewar small-pork market in London. Though pig production in Britain is heavy, importing meat interests still consider there is room for the high-quality, lean, 60 to 80 lb. carcass weight porker pig as a speculating trade. We threw this trade away when dairy prices rose; let us regain it quickly.
6. Mating 40 per cent of our national dairy herd by artificial insemination to beef bulls to provide a rapidly available and saleable type of beef carcass for export in the chiller form. These must be reared to 450 to 500 lb. carcass weight in 1½ to 2 years. This can be done on dairy farms and the better-quality fat-lamb farms.
7. Developing self-fed silage to facilitate not only cheaper dairy production but also beef production on the dairy farm; increasing our efficiency in all departments of pasture production and use.

Developments such as these will go a long way toward meeting the current problem. They will assist in meeting the long-term problem.

Whether we like it or not I believe we have reached the stage when we must abandon to some degree at least our belief in extreme specialisation as the best way to farm this country. Some measure of diversification is necessary now.

In the problems lying ahead, and in paricular in catering for our own expanding population, in terms of both food and imports, I am more than a little impressed with the possibilities of a much more diversified agriculture than we have at present. While increased supplies of meat, wool, dairy produce, vegetables, and small seeds must be obtained the balance of payment arguments, so potent even to heavily industrialised Britain, could force us to become self-sufficient in cereals and even in sugar, to take but two outstanding examples.

Today we spend nearly £9 million a year in importing these two commodities. In 10 years we could be spending at least £13½ million. These two products could be grown here. If England can produce 2 ton per acre crops of wheat and harvest them in a worse harvesting climate than our North Island, so can we. The modern grain dryer has revolutionised wheat growing in wet climates. Sugar beet production is no longer the occupation of a peasant farming community. It is a large-scale, mechanised industry. Study of the potentials and the problems in these two products should be accepted as a national responsibility of Government, industry, and research. They cannot be dismissed casually as unworthy of consideration.

Great Britain has become agriculturally strong in consequence of the abandonment of some of her traditional attitudes. Despite the strength of specialisation it may be necessary for us to do likewise. If nothing else my visits abroad of recent years have convinced me that New Zealand can have a diversified agriculture. I am almost convinced that one day it will.

On the long-term side of the farming dilemma before us the background facts that will determine the issue are the world and the local population trends. The former Director-General of Agriculture Mr E. J. Fawcett highlighted this a few years ago, when in outlining our agricultural responsibilities he drew attention to the population explosion now confronting the world and to our own population future. By the turn of the century the present world population of 3 thousand million people is expected to be 6 thousand million—a doubling up in a mere 40 years. In 10 years New Zealand will have 3 million people.

Whatever the short-term economic and man-made difficulties may be, the long-term prospects for this country, which can produce high-quality animal products cheaper than anywhere else in the world, are exceedingly bright and justify fully a completely optimistic and forward-looking policy on our part. The present is not the time for pessimism; it is not a time for standing still. We must continue to advance confident in our ability to make the most of the best country in the world.

Above all things we must gear our thinking to the present and probable future, not to the past 20 to 30 years.

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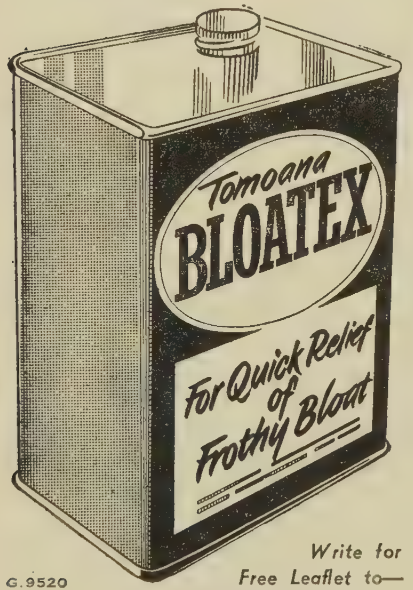
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Department of Agriculture's Annual Report

THE Annual Report of the Department of Agriculture for the year ended 31 March 1958 will be presented to the House of Representatives in the present session of Parliament.

Copies may be ordered from the Publications Section, Department of Agriculture, Box 2298, Wellington, or from the Government Printer, Wellington. The price per copy will be approximately **6s. 6d.**

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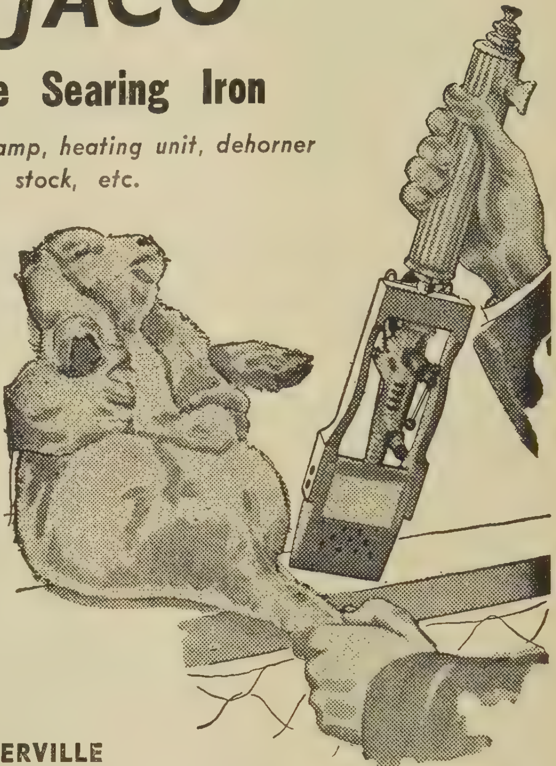

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How Poultry Farming Has Developed

RELATIVELY few poultry farmers except those associated closely with organisations such as the New Zealand Poultry Board or Poultry Provincial Councils find it easy to gain a comprehensive picture of the industry. Assembled in this article by F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, is much of the basic information on poultry farming in New Zealand.

THE poultry industry is primarily an egg-producing one, with an objective of producing sufficient eggs for our own population. Under present conditions there is no intention of producing eggs for overseas markets, though to ensure that there is an adequate supply of eggs at all times to meet public demand, egg production must show a controllable and limited surplus. Any reasonable surplus can be handled by the export of frozen egg pulp to external markets. For the industry to be healthy economically there should be a reasonable living from the production and sale of table eggs.

Size and Growth of Industry

Statistics available on poultry husbandry in New Zealand are limited and at times insufficient to assist those responsible for a marketing policy. Fortunately, a satisfactorily accurate check on numbers of all birds kept is made when the population census is taken every 5 years. The position at the last census (April 1956) was as follows:

Fowls ..	4,160,424	(female birds, 3,969,695)
Ducks ..	210,718	
Geese ..	60,938	
Turkeys	53,491	

The numbers of birds are small when compared with some of the large poultry-producing countries. However, to get these figures into proper perspective it is desirable to link them with population figures.

This is done with the figures for laying fowls, the most important class of poultry in New Zealand, in the following table, which shows totals of censuses covering 50 years. However, figures for the 1945 census have been omitted because it was taken in September and not in March or April as is customary and the questions on poultry were framed differently. Consequently the figures obtained are not comparable with those of other censuses:

		No. of fowls	Population	Birds per person
1906	..	2,784,000	936,000	2.9
1916	..	3,141,000	1,149,000	2.7
1926	..	3,308,000	1,408,000	2.3
1936	..	3,489,000	1,574,000	2.2
1951	..	3,829,000	1,939,000	1.9
1956	..	4,160,000	2,172,000	1.9

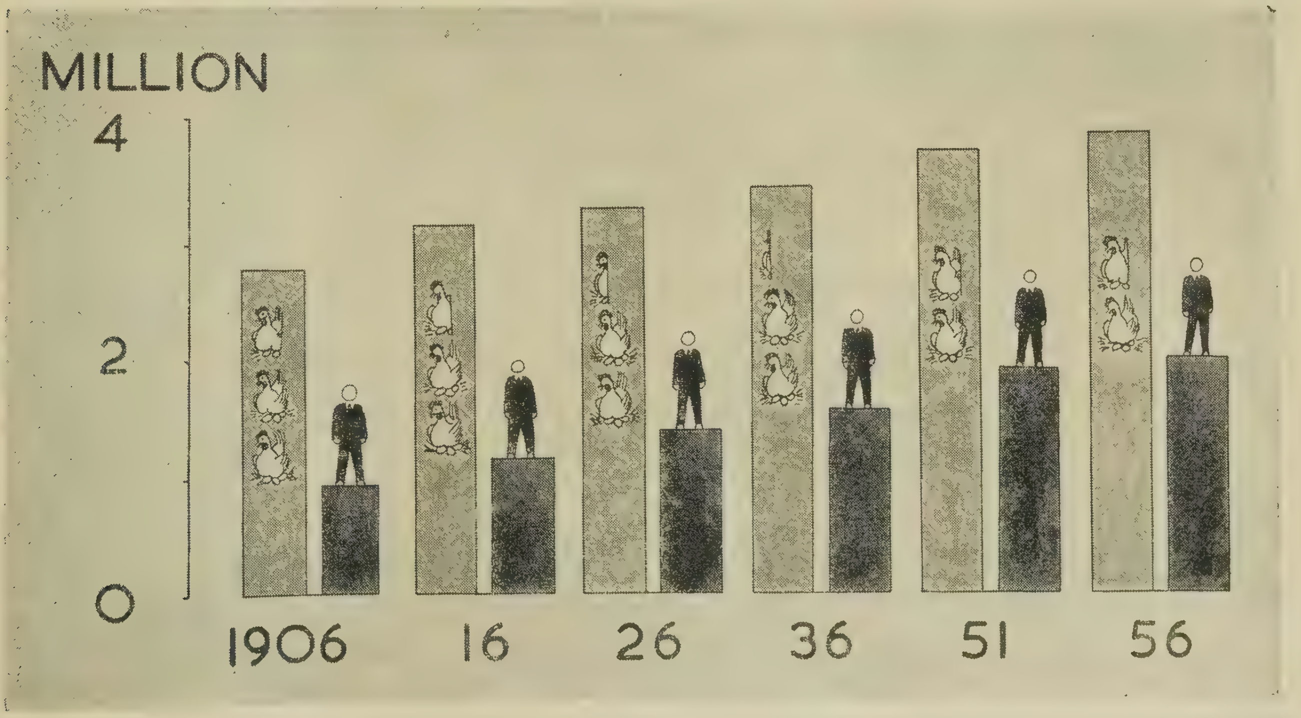
The table shows the steady but unspectacular growth of the poultry industry as population has increased, with a tendency for population to grow faster than the number of birds available to maintain egg supplies. This could mean that poultry numbers can be increased again without undue fear of over-production of eggs and that the people can eat more eggs per head per annum than at present. However, the higher number of birds kept in, say, 1906 and 1916 may have meant that people then ate more eggs or that more birds per head were needed to maintain a similar rate of egg consumption as today. There is no means of comparing the average rate of egg production per bird in 1916 with that of 1956.

Unfortunately strictly comparable figures are not always available for obtaining comparisons with other countries, but satisfactory comparisons can be made with the U.S.A. and Canada. Comparison with the United Kingdom figure is less satisfactory because table birds are included.

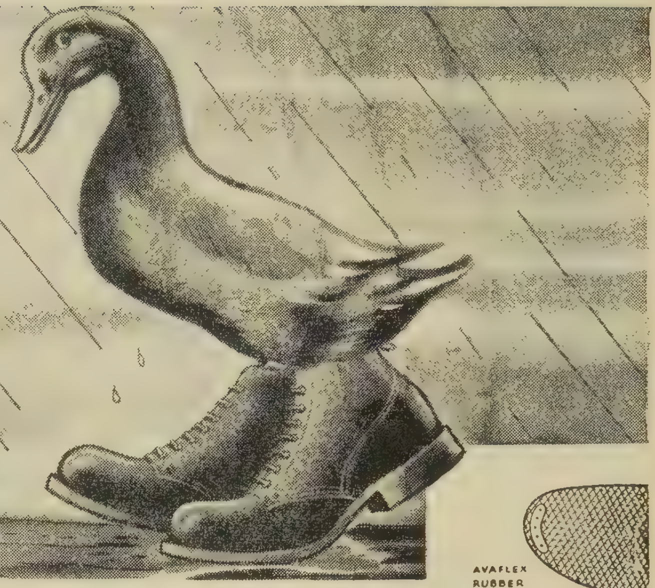
		No. of poultry		Population	Birds per person
U.S.A.	..	421,926,000 hens and pullets	..	164,303,000	2.5
Canada	..	21,401,000 birds over 6 months		15,601,000	1.3
U.K.	..	83,420,000 fowls	.. ..	51,221,000	1.6

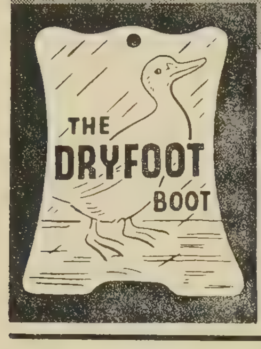
GROWTH IN NUMBERS OF LAYING FOWLS AND POPULATION IN 50 YEARS

(See text for detailed figures)



ALL WEATHER FOOTWEAR FOR FOLK WHO WORK OUTDOORS

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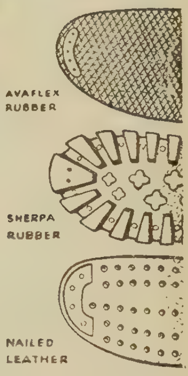
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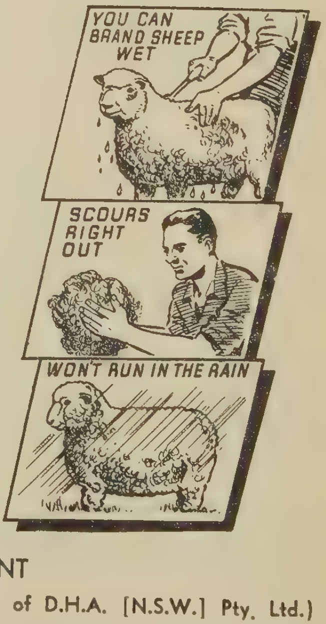
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The figures show that the poultry industry in New Zealand is comparable in size to that of other countries when related to population.

Ducks, Geese, and Turkeys

Apart from fowls, ducks are of the most interest to the commercial egg producer and to those responsible for a marketing policy. Duck eggs in the shell are not popular with the public and the number of ducks kept in New Zealand has not varied much in the last 50 years; in 1906 it was 282,000 and in 1956 210,700, the lowest figure on record. A peak (380,000) was reached in 1921. About 50 per cent of the ducks are in Auckland Province, 11 per cent in Wellington, 10 per cent in Canterbury, and 8 per cent in Taranaki.

In 1956 there were 53,000 turkeys, compared with a peak of 98,000 in 1911. Turkey production has also been fairly static over the years and limited, with no present indications of any appreciable increase in interest. Local demand for turkeys is considerable only at Christmas and high prices then may tend to discourage more general consumption at other periods. Sixty per cent of the turkeys are in Auckland Province.

Surprisingly there were in 1956 more geese than turkeys, the total being 61,000. The highest figure recorded was 66,000 in 1936. Geese are evenly distributed over New Zealand, but Auckland Province again heads the list with 25 per cent of the total.

Distribution of Poultry

Distribution throughout New Zealand of female fowls between 1926 and 1956 is shown below. Figures for female fowls are taken because they represent the egg production potential of the country.

FEMALE FOWLS AS PROPORTION OF TOTAL POULTRY POPULATION ON DISTRICT BASIS

Province	1926	1936	1951	1956
	per cent	per cent	per cent	per cent
Auckland ..	29	30	34½	37
Hawke's Bay	5	5	5½	5
Taranaki ..	5	5	5½	5
Wellington ..	15	15	14	13
Marlborough Nelson West Coast	7	6	6	6
Canterbury ..	21	21	18½	18
Otago ..	11	11	11	10¼
Southland ..	6	6	5	4¾

Auckland Province has for at least 30 years contained the highest poultry population, though Canterbury has often been referred to as the major centre. The poultry population in Auckland has steadily increased, but in Canterbury, on a Dominion percentage basis, has fallen. A relatively small decline in Wellington Province is attributable to loss of poultry farms round Wellington to housing.

In 1926 the North Island contained about 54 per cent of the laying birds and the South Island 45 per cent; by 1956 the North Island had 60 per cent and the South Island 40 per cent. In the latter year 68 per cent of New Zealand's people lived in the North Island and 32 per cent in the South Island.

Sizes of Flocks

About 90 per cent of New Zealand's poultry flocks contain fewer than 25 birds — they are the flocks of householders. Over the last 30 years the number of householders keeping birds has increased considerably and the trend continues.

Though the percentage of flocks with 1,000 birds or more (full-time commercial units) is extremely low, the number of units in this category has increased substantially over the years. There has not been a big change in the percentage of flocks having 50 to 999 birds. These are flocks of those who combine poultry keeping with some other pursuit (sideliners). The downward trend in the percentage of these flocks is probably due to fewer poultry being kept by livestock farmers as a result of buoyant incomes from dairy produce, meat, and wool until comparatively recently. This position can easily change owing to the likely lower earnings from dairy herds and other specialised production.

The following table shows the percentages of the various sizes of flocks for censuses between 1926 and 1956.

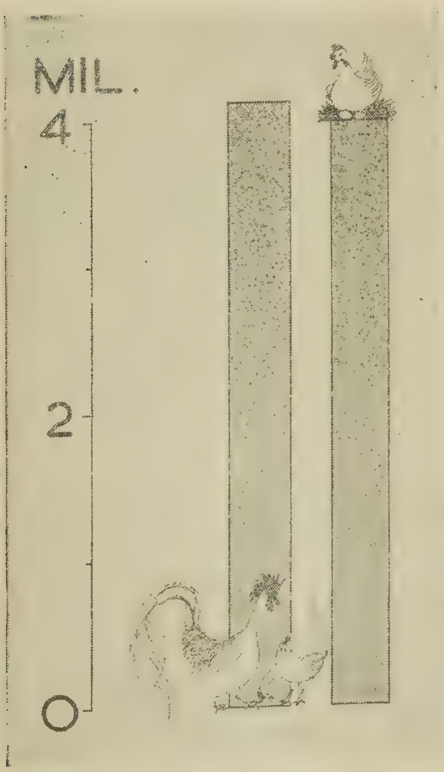
Size of flock	1926	1936	1951	1956
1-12 birds ..	35	39	56	61
13-24 birds ..	40	41	33	30
25-49 birds ..	18	13	7	5
50-999 birds ..	5½	6	3½	3
1,000 birds and over	.03 (41 farms)	.12 (194 farms)	.21 (366 farms)	.29 (521 farms)

For the 1951 census, figures were included in the report on poultry which permitted an assessment of the actual proportions of birds included in flocks of varying sizes. These figures supply perhaps the best picture of the industry. A purely arbitrary selection from these figures is given below:

Class of poultry keeper	Total no. of birds kept	Percentage of Dominion total
Household poultry keepers (1-24 birds)	1,837,203	48
Small sideliners (25-299 birds)	885,514	23
Large sideliners (300-749 birds)	375,247	10
Commercial poultry farmers (750 and over)	737,515	19

About half the fowls in New Zealand are kept to supply the family requirements, 30 per cent are on the properties of what are generally known as sideliners, and commercial farms have 20 per cent of the fowls. This 20 per cent is a very vital proportion, as it contains a high percentage of birds which are used as breeding stock and which provide very substantial numbers of the other 80 per cent of the birds in New Zealand.

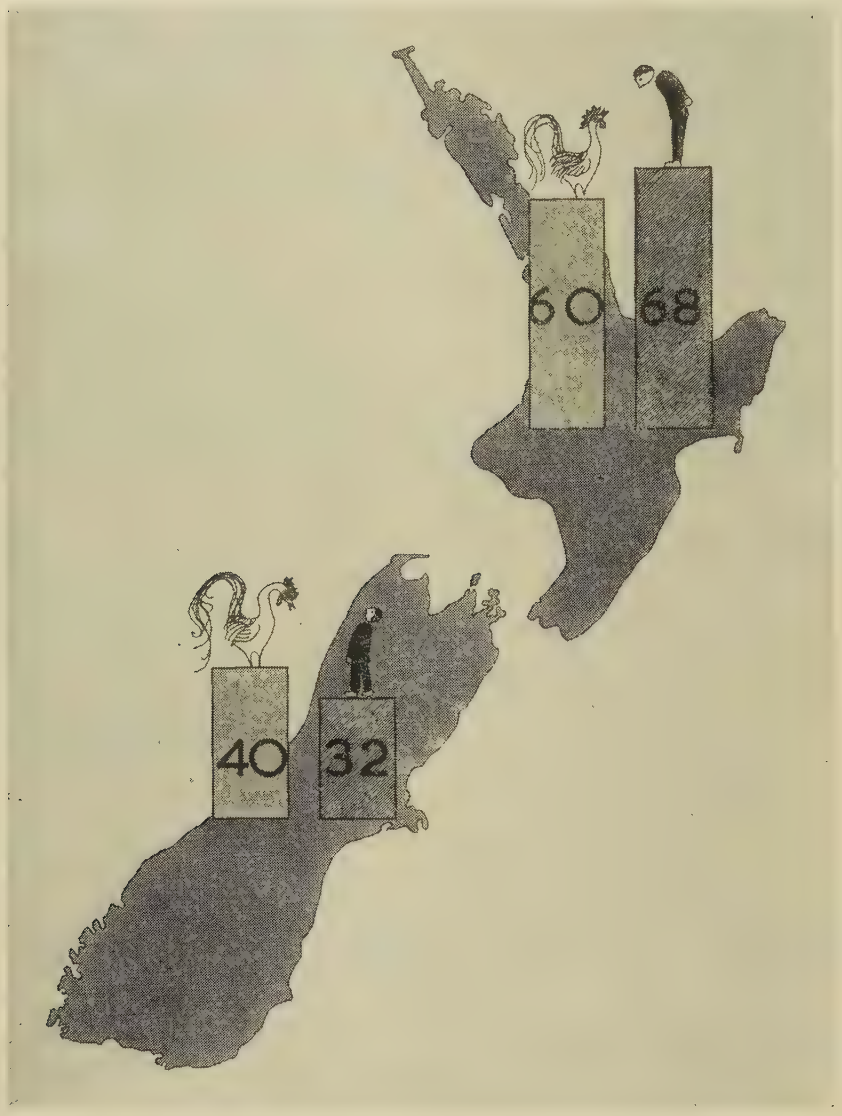
The sale of day-old chickens is an important feature of commercial poultry farming. Just how important



MAIN CLASSES OF POULTRY, 1956

(See text for detailed figures)

PERCENTAGES OF FOWLS AND POPULATION IN NORTH AND SOUTH ISLANDS



is shown by the totals of birds in commercial as opposed to household and sideliner flocks.

From the numbers of birds held by each class of producer it is possible to assess approximately the yearly output from each class on the basis of an average of 10 dozen eggs per bird for householders, 11 dozen for small sideliners, 12 dozen for large sideliners, and 13 dozen for commercial producers. The output for each class of poultry producer would then be:

	Total eggs doz.	**Per cent of N.Z. total**
Household poultry keepers	18,372,000	43.5
Small sideliners ..	9,740,000	23.0
Large sideliners ..	4,502,000	10.6
Commercial producers	9,587,000	22.7
	42,201,000	

These figures emphasise the large part played by household poultry keepers and small sideliners in providing eggs. The estimate of total egg production (42,201,000) represents a consumption of about 250 eggs per head of population a year.

Breeds Kept

There is obvious evidence of what are the most popular breeds in New Zealand, but no statistics on a breed basis are available. The trend in breed preference is not easy to define.

However, the Department of Agriculture has kept records of all birds blood tested. These records, representing a large cross-section of poultry units, show the breeding of the female birds mated and therefore provide a guide to breed preference.

BREEDS OF BIRDS BLOOD TESTED

	1948 per cent	**1952** per cent	**1956** per cent
White Leghorn ..	81	71	50
Australorp	16	21	39
Rhode Island Red	2	4	10
Other breeds ..	0.3	3	2

These figures support the firm contention of many poultry producers that the trend over recent years has been for the number of heavy breed birds to increase. The pronounced increase in Australorps has been influenced by the very marked increase in the use of crossbred pullets for egg production within the last 8 to 10 years.

From the 1957 annual list of accredited breeders in the New Zealand Poultry Flock Improvement Plan the numbers of female birds used in purebred matings only are shown below. These figures tend to confirm the breeds pattern already suggested.

	Female breeders	**Per cent**
White Leghorns ..	38,588	60
Australorps ..	21,377	34
Rhode Island Reds	3,681	6
Other breeds ..	229	0.3

Crossbred pullets now play a most important part in egg production in New Zealand and without doubt have contributed substantially to increased winter egg production where they have replaced pure White Leghorn pullets. The popular crosses are White Leghorn x Australorp, Australorp x White Leghorn, Rhode Island Red x White Leghorn, and White Leghorn x Rhode Island Red. Of all the breeding birds maintained by accredited breeders 52 per cent are used in crossbred matings.

Courses for Shearers

COURSES for 1958-59 for senior and junior shearers, conducted by the New Zealand Wool Board, will be held at Massey Agricultural College from September to February and at Canterbury Agricultural College, Lincoln, from August to February. Full details are available from the nearest provincial office of Federated Farmers, who are responsible for selecting trainees.

It is emphasised by the Wool Board that the courses are not for complete novices. Such a beginner should receive his first instruction from a provincial shearing instructor of the Wool Board and should be able to handle sheep and a handpiece before attending a college course.

The course for senior shearers is for a week and is for men who can shear 120 sheep and more a day. For juniors (men who can shear up to 120 sheep a day) the course is for 2 weeks, beginning on Tuesday of one week and finishing on Thursday of the following week.

Accommodation and instruction costs at the colleges will be paid by the Wool Board, but travelling expenses to and from the colleges must be met by trainees.

The Home Orchard in Spring

By D. W. McCALLUM,
Horticultural Instructor,
Department of Agriculture,
Blenheim

IT is often said that work carried out in spring and early summer plays the greatest part in the production of good fruit crops. This is debatable, as operations from pruning in winter to storing in summer all play their part. However, it cannot be denied that the foundation of disease control is laid in the pre- and post-blossom periods and thorough spraying at this time will go a long way toward ensuring a clean fruit crop. Modern scientific techniques have produced many new materials for disease and pest control and this article evaluates some of them for the information of the home orchardist. Other spring work discussed in the article includes the identification of pests and diseases, manuring, mulching, and spring pruning.

UNTIL immediately after the Second World War spray programmes in both domestic and commercial orchards were fairly simple because of the few materials in general use. Winter and summer oils, lead arsenate, and nicotine sulphate were the main insecticides and bordeaux mixture and lime sulphur the main fungicides. The current certification bulletin published by the Department of Scientific and Industrial Research lists over 30 groups of materials recommended for orchard sprays and within each group there are a number of different brands available.

To complicate matters most modern sprays are rather more specific in their action than the older ones. Arsenate of lead, for example, controls all chewing insects. In commercial orchards it has been largely supplanted by DDT, which gives good control of codling moth but which is relatively ineffective against leaf-roller caterpillar. The orchardist overcomes this problem by combining a spray called DDD with the DDT and the combination is more effective than either alone. However, there are further complications in that both DDT and DDD kill some useful predacious insects and a rapid build up of woolly aphis and red mite is probable if other sprays are not applied to check these pests.

The situation is similar with diseases. Newer sprays are more specific and the trend in commercial orchards has been to depart from general-purpose fungicides such as lime sulphur and bordeaux mixture and to use spray materials or combinations of spray materials which cope with particular problems.

[*Sparrow*

Sprays toxic to bees, such as DDT and lindane, should not be applied while the trees are in blossom, as bees visiting the flowers may be killed or they may carry poison into hives.

The commercial orchardist's spray programme is most complex and one might well ask why so many materials are desirable when the simpler programmes of 10 years ago gave reasonably good control of most pests and diseases. There are several reasons, but the main answer lies in tree health. The sulphurs, particularly lime sulphur, and arsenate of lead can check tree growth appreciably and cause fruit blemishes which reduce the market value of the crop. There is no doubt that the use of recently introduced spray materials has significantly assisted to increase the quantity and quality of fruit harvested on commercial orchards.

Store Spray Materials Safely

SPRAY materials must be kept out of reach of children, preferably locked away. Even those regarded as safe could undoubtedly cause anxious moments if they were swallowed, and the dangerous ones are really dangerous.

Empty containers should be destroyed and utensils used for measuring out the sprays should be kept for that purpose alone.

Spray Programmes Need Careful Consideration

The home orchardist is advised to tread warily when considering spray programmes and not to depart from the use of the older materials unless there are local reasons which make it desirable to do so. Fruit trees, well looked after, produce sufficient for the household, and slight russeting, though serious to the commercial orchardist, does not detract from the keeping quality or edibility of the fruit. Furthermore the lack of compatibility of some of these newer sprays when used together brings in complications, and even the experienced commercial orchardist has his problems here. Not only do some materials in combination cause damage, but others, when mixed, become relatively ineffective.

A basic spray programme for the home orchardist is set out on pages 126 and 127, but as each district has its own particular problems, those orchardists interested are urged to inquire at the nearest office of the Department of Agriculture where a horticultural officer is stationed and spray programmes suited to their requirements will be made available free.

In addition to the spray programmes there are a number of bulletins available dealing with the cultural requirements for most types of fruit and also one called "Disease and Pest Control in Garden and Orchards". These bulletins are also free on request.

TREATMENT OF PESTS OR DISEASES

Time of application	Treatment Quantities given are to be added to 4 gallons of water	Pest or disease
	Apples	
July-August. Need not be applied if scales, aphids, or mite eggs are not present	Winter oil 1½ pints	Scale insects, woolly aphis, red mite eggs
Early green tip	Bordeaux mixture: Bluestone 6½ oz., hydrated lime 5 oz.	Black spot, powdery mildew
Open cluster to pink ..	Lime sulphur ⅓ pint	Black spot, powdery mildew
Petal fall	Lime sulphur ¼ pint, lead arsenate powder 1¼ oz., hydrated lime 3 oz.	Black spot, powdery mildew, codling moth
Two weeks after petal fall; repeat every 18 to 21 days until end of February ..	As for petal-fall spray	Black spot, powdery mildew, codling moth, bronze beetle, leaf-roller caterpillar
When pests appear, about December-January ..	Summer oil ⅛ pint	Red mite, scale insects, woolly aphis
	Pears	
July-August. Need not be applied if scales or mite eggs are not present ..	Winter oil 1½ pints	Scale insects, red mite eggs
Early green tip	Bordeaux mixture: Bluestone 6½ oz., hydrated lime 5 oz.	Black spot
Open cluster to pink ..	Bordeaux mixture: Bluestone 1¼ oz., hydrated lime 2½ oz.	Black spot
Petal fall	Bordeaux mixture as for the previous spray, plus lead arsenate powder 1¼ oz.	Black spot, codling moth
Two weeks after petal fall; repeat every 21 days until end of February	As for petal-fall spray	Black spot, codling moth, leaf-roller caterpillar, pear slug
When pests appear	Summer oil ⅛ pint	Red mite, scale insects

The programme recommended for apples may be substituted for that for pears, especially on tender varieties susceptible to russet.

	Stone Fruits	
June-July. Need not be applied if scales or mite eggs not present	Winter oil 1½ pints	Scale insects, red mite, green aphis
Blossom - bud movement (usually early August for most varieties). It is important to apply this spray at the right stage for control of leaf curl ..	Bordeaux mixture: Bluestone 6½ oz., hydrated lime 5 oz.	Leaf curl, shot hole, bladder plum
10-14 days later	Bordeaux mixture: Bluestone 4 oz., hydrated lime 5 oz.	As this spray is mainly for leaf curl, it may be omitted if the disease is not troublesome
Late pink	Lime sulphur ⅓ pint	Brown rot
Petal fall; repeat every 3 to 4 weeks until 2 weeks before picking	Lime sulphur ¼ pint	Brown rot, shot hole, leaf rust

For apricots substitute colloidal sulphur, 2 oz., for the lime sulphur sprays.

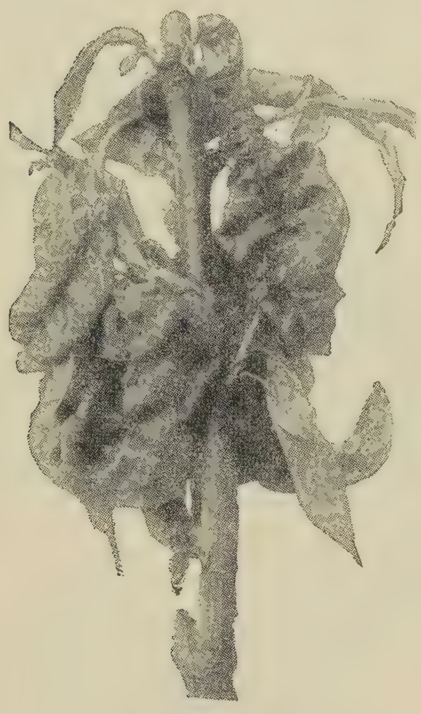
For the control of leaf-roller caterpillar and pear slug on plums and cherries (about January-February) add ¾ oz. of basic lead arsenate to the sprays due about that time.

At the first appearance of black or green aphis add nicotine sulphate, 4/5 fl. oz., to the next spray and repeat the application of nicotine sulphate 14 days later.

(Continued on page 127)

Pests and Diseases

Though a recommended spray programme may be followed conscientiously, some pests seem inevitably to creep in. Worst among these are woolly aphis, peach and plum aphis, red spider, and leaf hopper. Malathion, available either as a wettable powder or as an emulsion, gives good control of all of these. Thorough wetting of the trees is essential and two sprays may be necessary. This material is relatively ineffective when mixed with alkaline sprays such as lime sulphur, bordeaux mixture, or hydrated lime. Consequently it is suggested that it be applied as a special spray midway between two sprays of the ordinary programme.



Early bordeaux sprays are necessary to control leaf curl.

Woolly aphis is readily recognised by the mass of white, woolly material which accumulates around the buds of affected trees. This woolly covering affords the insect considerable protection and that is why thorough wetting is necessary. If only one or two trees are affected, dabbing the infested parts with a brush or cotton wool dipped in methylated spirit will give excellent control.

The first sign of aphids on stone fruit trees is a characteristic distortion or curling of the young leaves on the tips of new wood. This distortion should not be confused with that caused by the leaf curl fungus. Aphids cause an incurving of the leaves with no marked change in foliage colour. When the leaves are flattened out aphids will be present on the undersides. Leaf curl distorts the leaf with more of a puckering effect, the tissue is thickened, and there is usually marked discolouration, the green changing to a yellow or red.

Red mite is harder to detect unless a careful and regular check is made. The first sign is usually the browning or bronzing of the foliage, and a close examination will show very small reddish brown insects, mainly on the undersides of the leaves. There will probably be eggs present, these being small and a brighter red.

TREATMENT OF PESTS OR DISEASES

Time of application	Treatment Quantities given are to be added to 4 gallons of water	Pest or disease
	Citrus Fruits	
For lemons only before the blossoming of the main crop in October	Bordeaux mixture: Bluestone 4oz., hydrated lime 5 oz.	Verrucosis, melanose, grey scab, wither tip
Petal fall of main crop (November)	Bordeaux mixture as above ..	Verrucosis, melanose, grey scab, wither tip
Early January, but not for lemons	Lead arsenate powder 1 oz.	Leaf-roller caterpillar
Mid-February	*Summer oil 1 pint, nicotine sulphate 4/5 fl. oz. (5 teaspoons) ..	Scale insects, black aphis
End of April	Summer oil 1 pint	White wax scales
May-June	Bordeaux mixture: Bluestone 4 oz., hydrated lime 5 oz.	Verrucosis, wither tip, brown rot
	Berry Fruits (other than Strawberries)	
June-July. Need not be applied if scales are not present	Winter oil 1½ pints	Scale insects
Green tip (about September)	Bordeaux mixture: Bluestone 6½ oz., hydrated lime 5 oz. For raspberries and loganberries add lead arsenate powder 1¼ oz.	Leaf spot, cane wilt, bud moth
November and after the fruit has been picked	Bordeaux mixture: Bluestone 4 oz., hydrated lime 5 oz. For raspberries and loganberries add lead arsenate powder 1¼ oz.	Leaf spot, cane wilt, bud moth

* Include nicotine sulphate in later sprays if aphids are still present.

Tree Tomatoes

For control of mildew apply lime sulphur (¼ pint to 4 gallons of water) at monthly intervals from November to February.

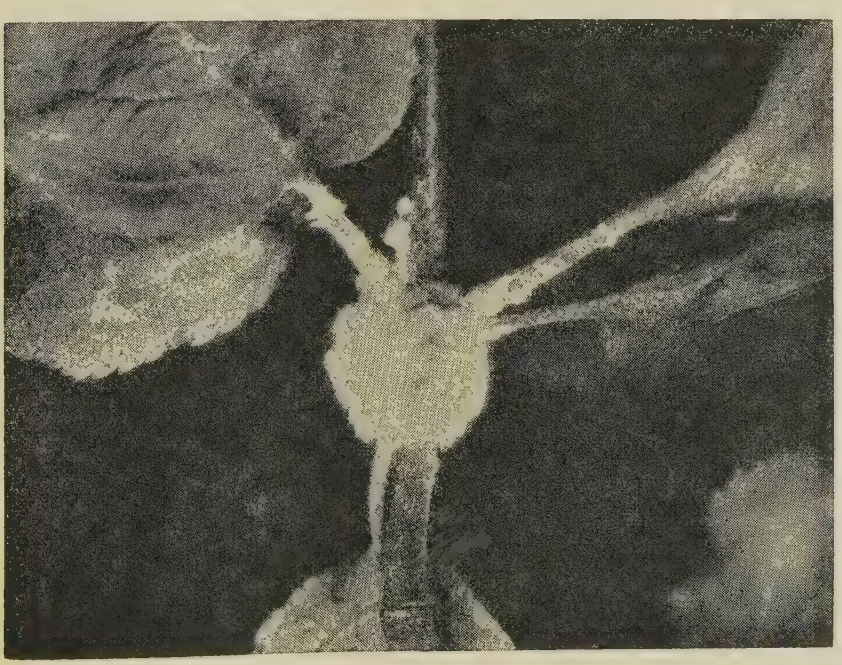
Strawberries

For control of leaf spot apply bordeaux mixture (bluestone 4 oz., hydrated lime 5 oz.) in August and repeat a month later. If red mite is present the second bordeaux mixture spray may be replaced by lime sulphur (¼ pint to 4 gallons of water).

Passion Fruit

For control of brown spot apply bordeaux mixture (bluestone 4 oz., hydrated lime 5 oz., water 4 gallons) in September and October.

For control of grease spot in late crops apply bordeaux mixture at the same strength at monthly intervals from April to June.



[*A Shell photograph*

Woolly aphis infection on an apple twig, showing the typical waxy threads secreted by the pest.

The early bordeaux sprays on peaches and nectarines are particularly important if leaf curl is to be avoided. Bud movement of leaf buds is the latest time for this spray to be effective and where there is any doubt the tendency should be to spray somewhat earlier. In districts where brown rot is a problem the bordeaux sprays should be followed by weekly applications of materials such as thiram or captan through to petal fall.

Brown beetles are active in November. Their damage is readily recognised—pieces are eaten out of the edges of the leaves of pip and stone fruit by the beetle, which is on the wing during the last half hour of daylight. Sometimes there is fruit damage, but this is not usually serious. Arsenate of lead will reduce their numbers on pip fruit, but it should not be used on stone fruit, as damage will almost certainly occur. DDT may be used instead.

The larva of the brown beetle is the well known grass-grub. It lives in the soil and feeds on the roots of many plants, including strawberries and raspberries. Fifty per cent DDT applied in early spring at 1½ lb. per 1,000 sq. ft. should give freedom from grass-grub damage for 2 or 3 years.

No insecticides of any sort should be used on trees in flower. The risk of reducing the bee population is too great and, in any case, insect damage rarely occurs at this stage.

Manuring

The natural fertility in most New Zealand soils will give good fruit production for a number of years, but it would be a short-sighted policy to wait until the fertility is reduced before supplementing it.

Nitrogen, phosphate, and potash are all required for good fruit production and a mixture containing all of these elements is desirable. Requirements vary from district to district and even within a district according to the soil type, but the accompanying table is a sound general guide.

	Rich soils Parts by weight lb.	Average soils Parts by weight lb.	Poor soils Parts by weight lb.
Apples, pears, apricots			
Sulphate of ammonia	—	1	1½
Superphosphate ..	2	2	2½
Blood and bone ..	2	2	2½
Sulphate of potash	1	1	½
Total	5	6	7
Peaches, plums, and sub-tropical fruit			
Sulphate of ammonia	½	1½	2
Superphosphate ..	1½	1½	2
Blood and bone ..	2	2	2½
Sulphate of potash	1	1	½
Total	5	6	7
Citrus			
Sulphate of ammonia	1	1½	2
Superphosphate ..	1½	1½	2
Blood and bone ..	1½	2	2½
Sulphate of potash	1	1	½
Total	5	6	7

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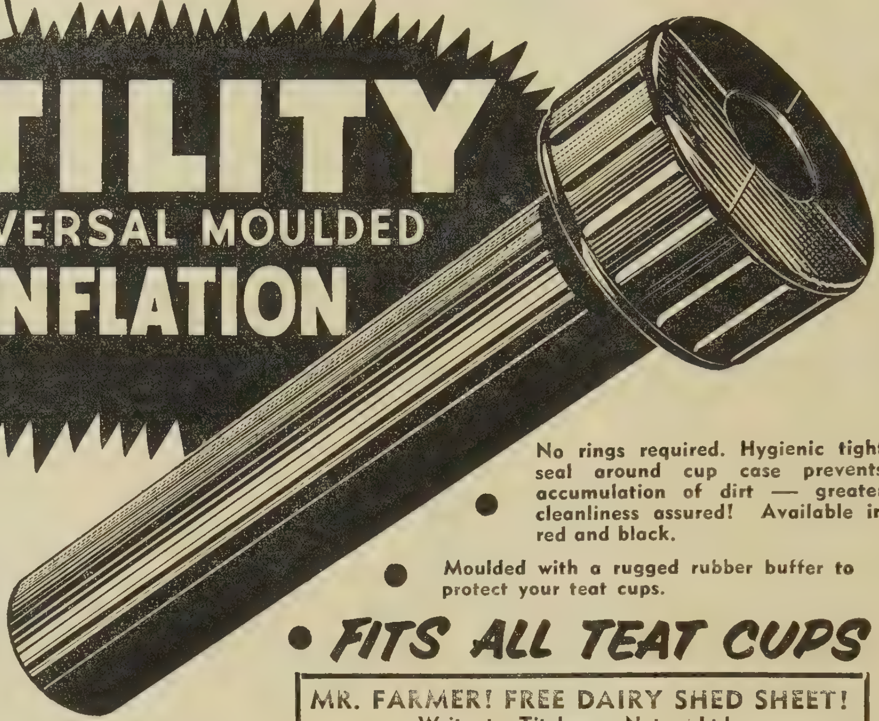

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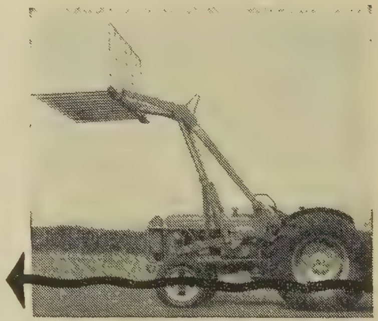

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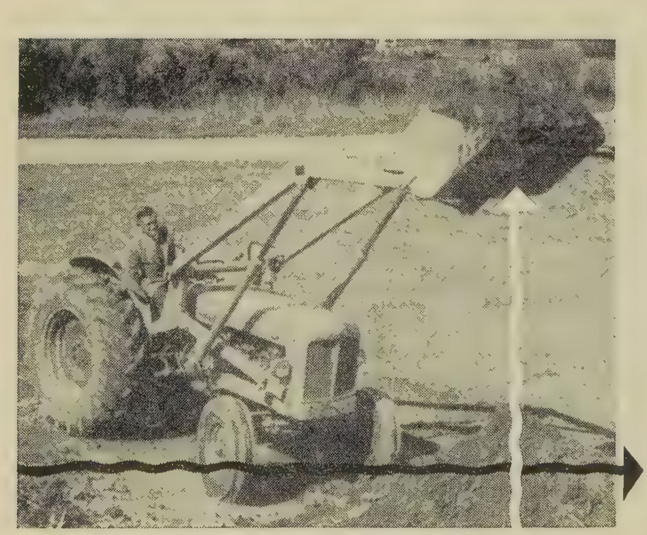

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Grassed orchards should be mown ▲ regularly without a catcher. The clippings will form a light mulch.

Rates of application vary according to the age and productive capacity of the tree, but from 1 lb. for very young trees to 15 lb. for trees in heavy production would be suitable. The fertiliser should be spread evenly over the ground out to or just beyond the perimeter of the branches of the tree. Berry fruits will respond to about ½ lb. per bush and strawberries ½ lb. per yard of row.

Mulching

In districts subject to prolonged dry spells mulching the soil around the roots will conserve moisture and reduce weed competition. Clean straw is probably best for this purpose, but sawdust, stack bottom, and compost are all suitable. Hay, unless well rotted, contains too many grass and clover seeds which can become weeds. A depth of 2 or 3 in. is adequate for the mulch.

Strawberries will keep much cleaner and suffer less from mud splashes and rots when mulched and beside the materials already mentioned pine needles are very satisfactory for them. Mulching has a tendency to bring the plant roots to the surface, and if the mulch is removed at any time, the plants or trees will suffer more from dry conditions than if the mulch had never been applied. Maintaining the mulch is therefore important.

Cultivation between trees may also be avoided by grassing down, and a lawn mixture suitable for the district may be sown. **The lawn must be regularly mown.** Clippings are best left lying where they fall, as they will add to the organic content of the soil and increase the water-holding capacity.

Young trees should have a cultivated area around them of at least a foot radius from the trunk. If they do not, severe moisture competition from the grasses is likely in dry spells. Though not essential, it is a good idea to maintain this cultivated area continuously to prevent the trees being damaged by the mower.

Pruning

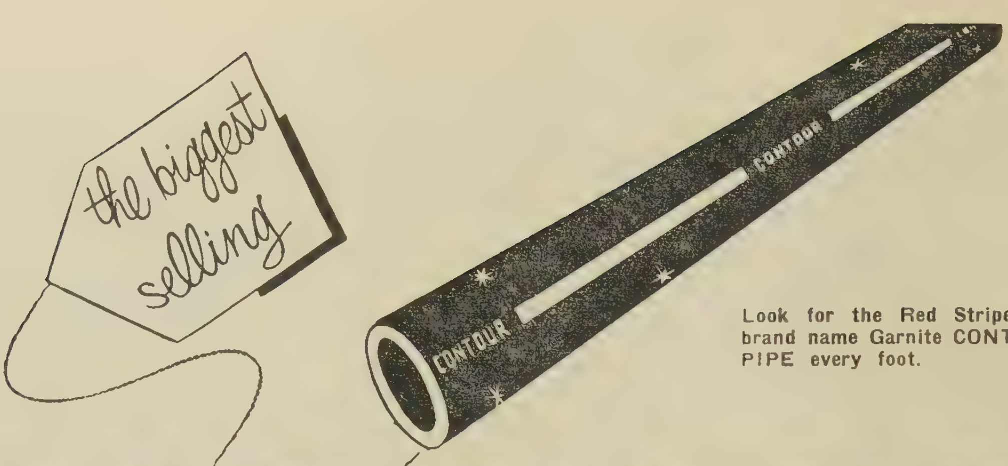
Citrus may be safely pruned after the risk of damaging frosts is over. Very little cutting is required, as most varieties form well shaped trees. Sometimes strong water shoots or other undesirable growths develop, especially on lemons, and these should be removed.

Summer pruning of grapes will assist in swelling the fruit. This pruning should not be carried out until the bunches are fairly well formed; otherwise the effect will be to send out further laterals.

The growing point of laterals should be pinched out 2 or 3 leaves beyond the bunch.

The time of harvest of tree tomatoes is greatly influenced by the time of pruning. Shortening the branches in early spring will give an early crop, but delaying the work until October or November will produce a late crop.

▼ Mulching strawberries with straw or other suitable material will conserve moisture, keep fruit clean, and reduce rots. Sparrow photograph.



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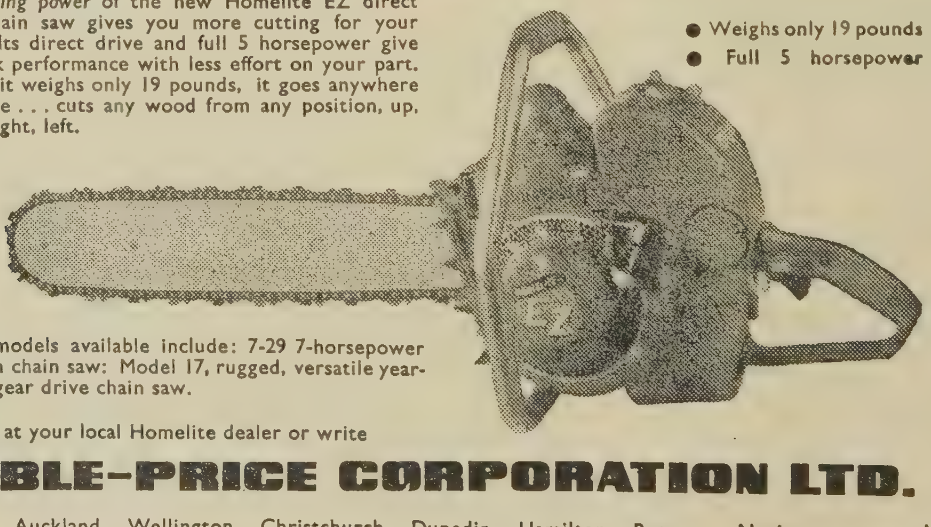

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Developments in Design of Pig Housing

IN recent years designs of pig housing have incorporated features aimed at reducing losses in pigs and food and saving labour. Though research work indicates that these features are desirable for efficient production, in practice some modifications become necessary to achieve an economical and practical unit. In this article E. D. Edwards, Research Officer, Department of Agriculture, Wellington, discusses recent trends in design of pig housing.

ABILITY to raise healthy pigs and secure the maximum return for capital invested will depend on provision of the following:

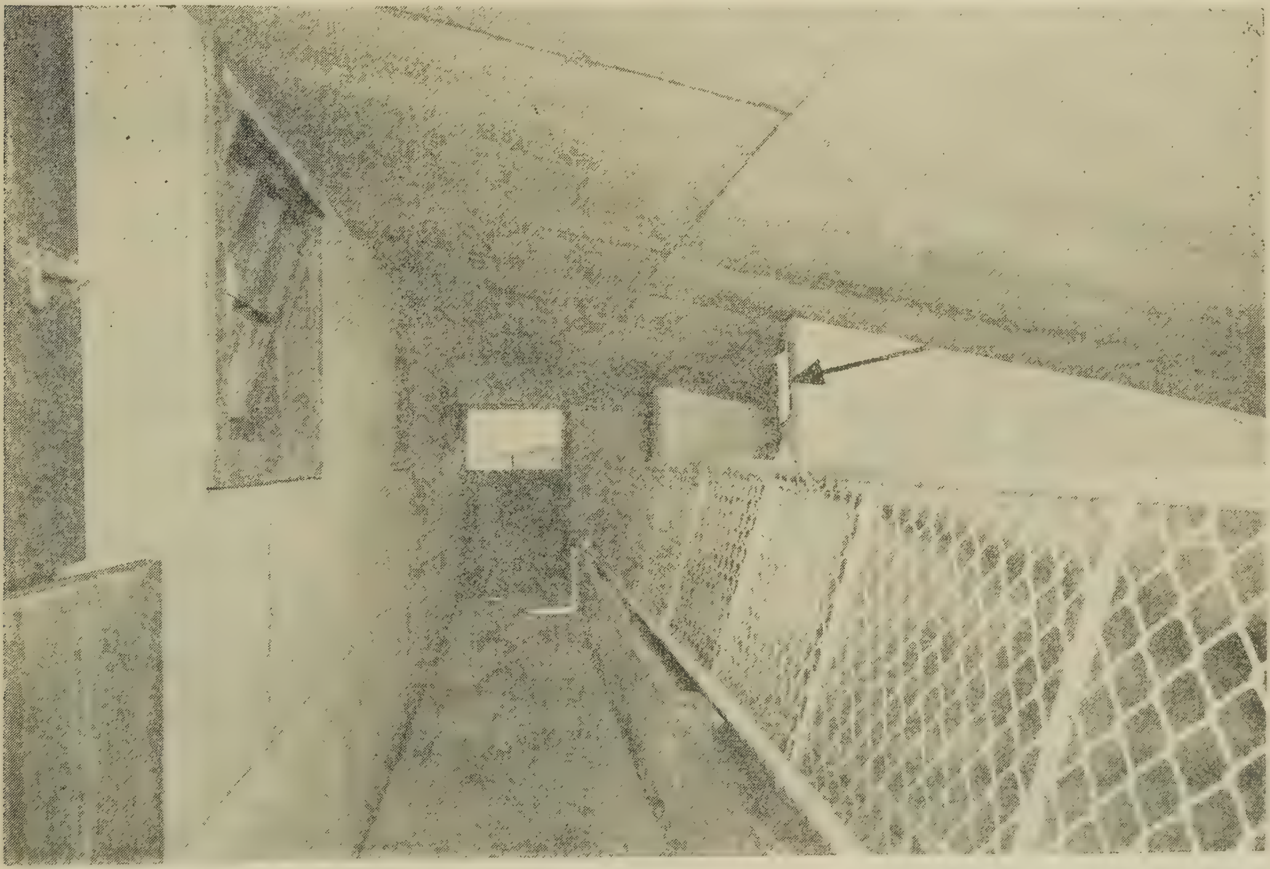
1. A sunny, sheltered site with good drainage.
2. A layout to suit the site and enable the piggery to be worked conveniently.
3. A design that permits effective pen drainage and hygienic conditions to be maintained.
4. A warm, dry, draught-free bed area, particularly for baby and growing pigs.
5. Farrowing quarters designed (preferably based on the principle of the round farrowing house) to reduce losses from overlying by the sow.
6. A creep area to encourage suckers to eat extra food.
7. Ample trough space in each pen.
8. Ready access to outside runs, at least for farrowing and dry-sow accommodation, but effective control at all times of stock.

Layout

An ideal site for a piggery within easy operating distance of the milking shed is rare. The most troublesome feature of readily accessible areas is probably that of low-lying, wet ground. This type of country requires a layout which will keep the pigs out of the mud as much as possible and an appropriate management policy. There is no doubt that many farmers fail to appreciate these two facts and have suffered appalling losses in pigs and temper.

However, even on lighter and drier land a layout which permits controlled access to pasture has become important for two reasons. Firstly, full advantage can be taken of pasture as a food; secondly, work studies show that a concentrated layout of this type can result in more economical use of labour and capital when management is good than do extensive layouts.

Though regular cleaning out is required in concentrated layouts and may appear to some to be an unwarranted burden and thus a disadvantage of this arrangement of units, some farmers in most districts can show that cleaning need not be distasteful and time consuming. Particularly is this so when feeding management ensures that the pigs are not overfed and encourages them to dung and urinate in the area allocated



Harper Adams-type fattening house, showing the extent of lining in the roof and walls and a thermometer (arrow) installed. The use of thermometers in piggeries is becoming more common as farmers appreciate the need for warm housing for pigs.

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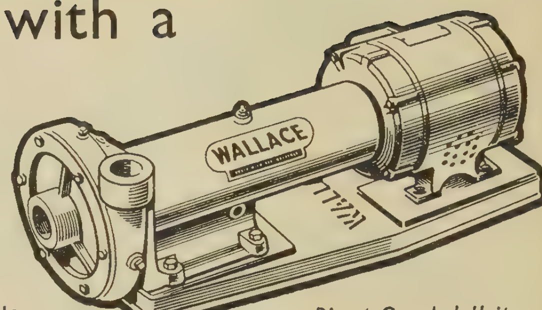

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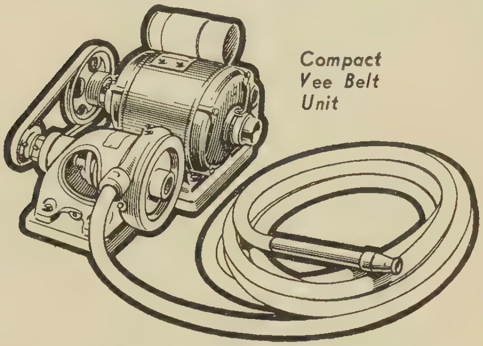

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for that purpose, and also when a pressure water supply is used for hosing out wastes. Layouts which permit convenient feeding and cleaning help to stimulate the interest of the pig man and thus encourage better management.

Two forms of layout which allow efficient use of labour and materials are the radial system and the compact arrangement of units on either side of a central feeding race. Part or the whole of such layouts can be roofed over if necessary in exposed localities. Generally the radial arrangement of units about a central working area is more suited to, and limited to, use on smaller piggeries, whereas the other type is more efficient in larger piggeries. Both types can be erected in stages to suit the pocket or labour of the farmer, but this is determined to some extent by pen design.

Access to pasture can be given from each unit or from a limited number of units. Suckling pigs do much better if allowed a periodic run out from about 4 or 5 days of age, but if this is not wise because of wet conditions, access to a clean turf in the pen will suffice. Fattening pigs fed on whey benefit from regular runouts, but continuous access need not be provided.

A paddock to each pen is not warranted. One paddock can serve several units and be of a size which allows easy operation of tractor and implements for cropping, etc. Electric fences are useful in giving further subdivision and full utilisation of pasture.

"Two-climate" Housing

The "two-climate" housing principle is not new as it is practised by wild animals and birds in their native habitat, but its practical application to domesticated stock introduces many difficulties. It explains why the pigs on some farms do better when allowed to run "wild", where they can find quarters more natural to them than were provided by the farmer. Though surprisingly simple accommodation can be very effective, commercial pig production demands more permanent buildings in surroundings much removed from the original.

Research workers are gradually assembling valuable information on housing as it affects pig performance, and the practical application of this data will become increasingly important with the demand for a more efficient industry.

The two-climate principle of housing pigs recognises that pigs should have a warm, dry bed, but that baby pigs and growing pigs require greater warmth than do more mature pigs. At birth the baby pig leaves the mother with a body temperature of about 102 degrees F. but may find itself in air temperatures ranging from freezing point (32 degrees) to 70 degrees. Because of its inability to control body temperature for several days after birth, the piglet needs warmth additional to that supplied by the sow when weather produces temperatures below 70 degrees.

Brooder lamps are available and are recommended for providing this warm zone for the piglets for 1 week after farrowing. Over this period the sow does not require such a high air temperature for comfort. She finds a temperature some 10 to 15 degrees lower most comfortable.

It will be noticed that the emphasis is on the temperature of the sleeping quarters. Much lower temperatures outside can be withstood without seriously interfering with growth and health, provided there is reasonable shelter from winds and rain. In fact movement in cooler surroundings stimulates the pigs' temperature-regulating mechanisms and enables them to withstand weather changes better, besides stimulating appetite and promoting health.

Some protection from very hot weather is equally desirable. For pigs the most economical and efficient cooling medium is water from a spray or in a wallow.

Insulated Kennels

The pigs' requirements can be met best by providing an insulated kennel just sufficiently large to allow all the pigs in the pen to retire in comfort at will or to feed and exercise outside the kennel in a more variable climate.

The air temperature inside the kennel, or in any pig house, is governed by the following:

(a) Outside air temperature.

(b) Amount of air space within the kennel or house.

(c) The number and size of pigs occupying the building.

(d) The insulation value of the materials in the roof (primarily) and in walls and floor.

(e) The rate of air change or ventilation allowed.

To maintain temperatures suitable for the class of pig being housed these five factors must be controlled in an economical and practical way. The methods by which this can be achieved will now be considered.

(a) Outside Air Temperature

Some districts in the pig raising areas of New Zealand have much more favourable climates than others and so pig housing need not give so much protection from the elements in comparison with housing in cold, exposed localities. However, by constructing a kennel or house within a house some control over the air temperature outside the kennel can be obtained and thus over that inside the kennel.

(b) Amount of Air Space

One of the objects in providing pigs with comfortable quarters is to ensure that food is not wasted by the pig in an endeavour to maintain body warmth. This apparently takes place in a 25 lb.-liveweight pig at 42 degrees F., a 100 lb.-liveweight pig at 35 degrees, and a 200 lb.-liveweight pig at 23 degrees. Similarly, when temperatures exceed 80 degrees appetite is depressed and feeding efficiency falls rapidly.

The most economical way of warming the air surrounding the pigs is to conserve the heat emitted by the pigs themselves arising from digestion of their food. The air will be warmed more quickly if the space is reduced to a minimum by lowering the roof in conventional houses or by installing a kennel, provided ventilation and insulation are controlled.

Building costs normally demand that roofs are kept low over sleeping quarters, but this should not be at the expense of convenient working conditions.

In a small air space in hot weather pigs could become overheated, particularly when confined to a poorly insulated house such as one made of corrugated iron. Insulation of the roof especially and ventilation will improve matters, but a water spray or wallow brings greatest relief to the pig. Failing this, some shade is necessary and is always desirable, provided it is not such as to create draughts.

Temperature observations in wooden farrowing houses 8 ft. x 8 ft. x 4½ ft. (288 cub. ft.) and round houses 3 ft. high (160 cub. ft.) similarly stocked have shown small differences in variation and range of temperatures. Ventilation through the entrance and other openings about the roof of the round house is probably greater in relation to the cubic capacity of the house and counters any rise in temperature caused by a lower roof.

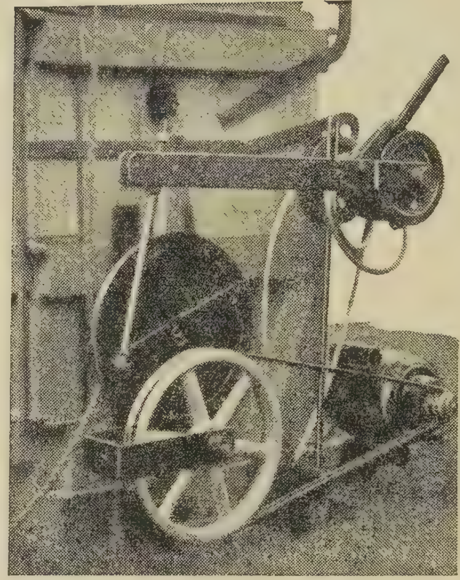
Merely lowering the roof to reduce air space may not therefore increase temperature unless ventilation is also reduced and this can be done quite easily by hanging a sack soaked in creosote over the entrance with a small quantity of sand in the bottom.

(c) Number and Size of Pigs

Though the amount of heat emitted by pigs increases with their size, heat loss per pound liveweight is greatest in baby pigs. Hence it is most important not to expect suckers or weaners to warm up a house designed for baconers.

There are three methods of providing comfortable quarters for growing pigs apart from that used for the first week after birth, when brooder lamps can be used economically:

1. For suckling pigs an insulated kennel or zone within the farrowing house is probably most effective. Round farrowing houses have this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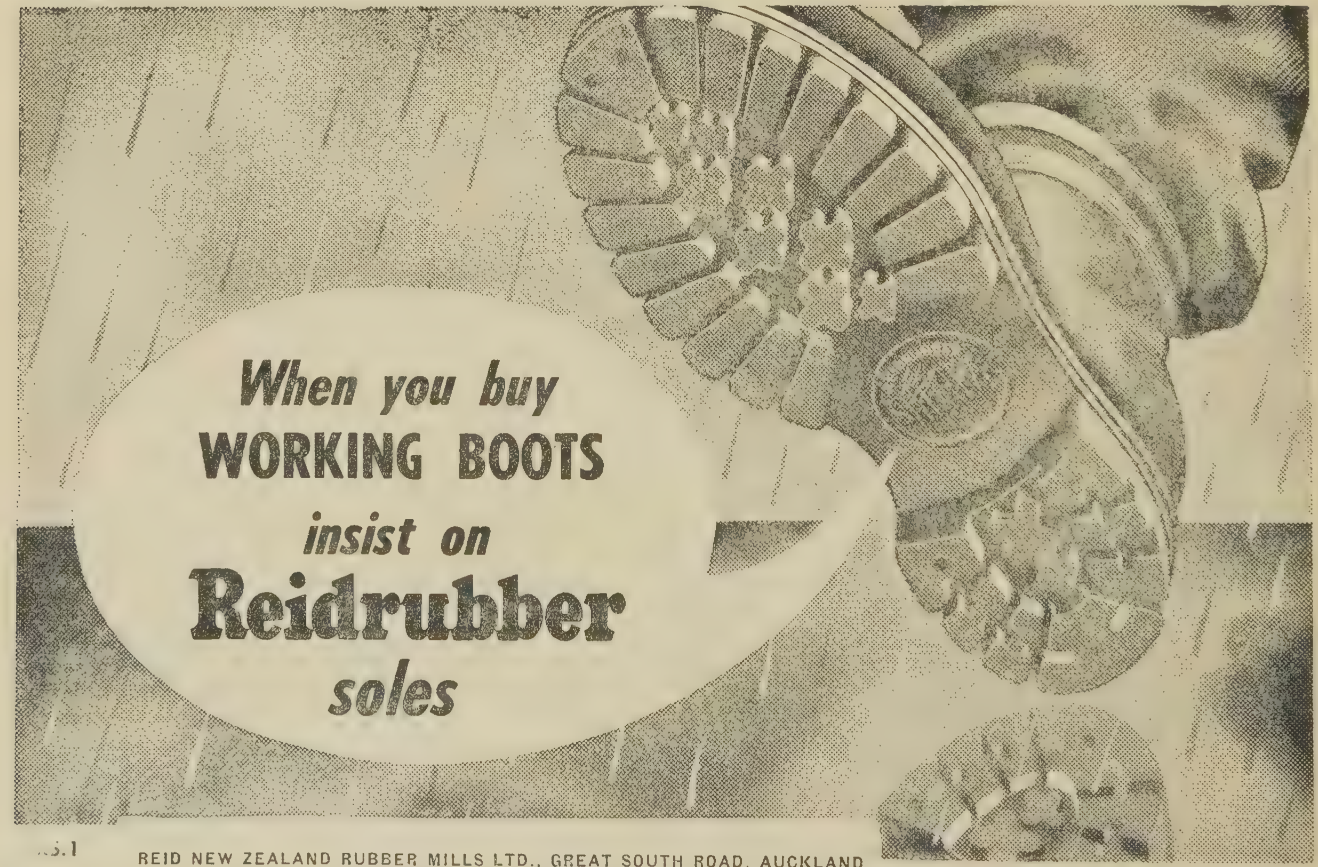

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zone roughly in the centre of the floor, but if it is placed in a corner in an orthodox unit the result will be satisfactory.

If at weaning pigs are transferred to a fattening unit, the kennel idea can still be employed. One which can be adjusted or extended as the pigs grow is ideal, but unless this can be done easily the kennel may fall into disuse.

2. A number of units of small dimensions suitable for housing an average litter at weaning could be included in the piggery. This would have well insulated sleeping quarters still based on the kennel principle. Instead of the size of the kennel being adjusted as the pigs grew, they would be transferred to a larger pen after a month or so.

3. A more natural method simply involves supplying adequate dry bedding, straw, or wood shavings, so that the pigs can "bury" themselves in it. Where these materials are readily available and are used properly they serve the purpose admirably and allow very cheap houses to be used.

The important point is to provide the means by which each class of pig can readily find a cosy bed, particularly at birth and at weaning time. Correct feeding is important in maintaining clean, dry quarters, as also is ventilation, for a kennel of stale air seems to encourage messing in the wrong place.

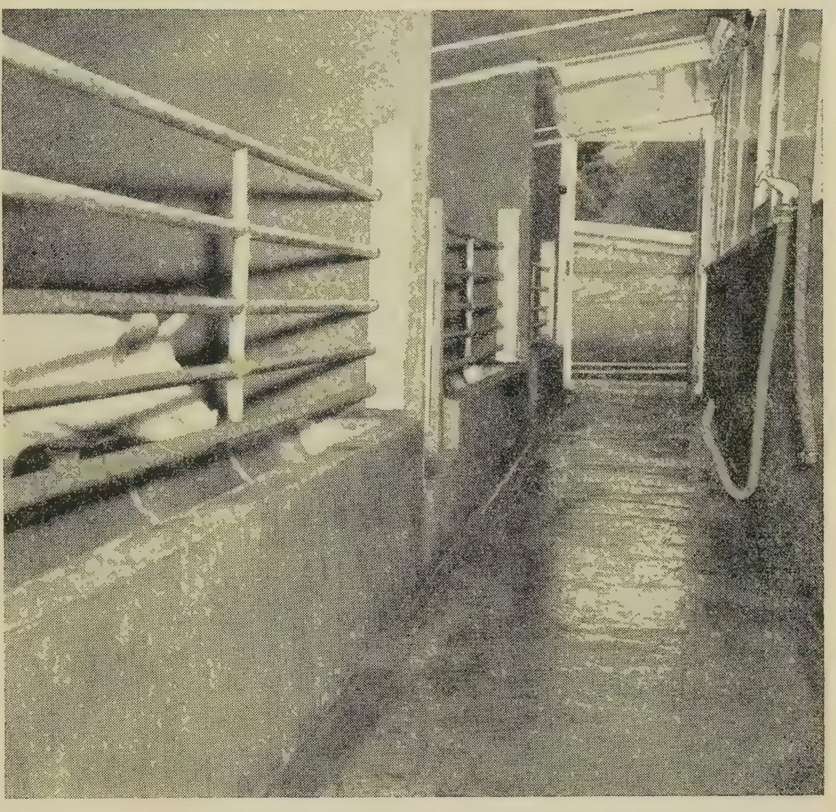
Insulation and Ventilation

Insulation and ventilation can be dealt with together, because the purpose of thermally insulating a building is not merely to prevent transfer of heat but to prevent excessive condensation and down draughts and enable ventilation to be carried out more effectively.

The system of housing the pigs determines the difficulties associated with ventilation, because the more completely pigs are enclosed within a building the more control is required over ventilation to eliminate waste air and moisture yet maintain the required warmth. Under our liquid-feeding methods the problem is accentuated and this accounts for many of the disappointing results achieved with enclosed houses.

A well insulated enclosed house is expensive, but can be justified when the farmer is prepared to use it properly. A recent development in the design of this type of house, the "barn" piggery, incorporates most of the principles already discussed in this article and promises to meet the requirements of the farmer for economic housing.

Briefly the barn piggery consists of a series of units on either side of a central race, all under a gable roof. The superstructure is intended only to give shelter from rain and wind, is not insulated, and can be built cheaply. Warm sleeping quarters appropriate for the classes of pigs are prepared by using insulating panels in the form of a kennel. These panels can be easily constructed with aluminium sheet or foil and reflect the heat radiated by the pigs. (A report on this method of insulation was given in the July 1957 "Journal" (page 43).



Interior of an effectively insulated fattening house. Water under pressure from the hose at right greatly simplifies cleaning.

Such a design reduces cost of construction and practically eliminates condensation. For further information farmers are advised to contact their local District Pig Council supervisor.

Reducing Condensation

Farmers with enclosed or semi-enclosed (outside-yard) pig houses in which the atmosphere becomes damp and condensation occurs can reduce this trouble in several ways.

The first step is to increase ventilation, if this does not cause draughts and a reasonably even temperature can be maintained over the bed. A slightly cooler (50 to 60 degrees) environment with fresh and comparatively dry air is better than an ammoniated "Turkish bath". The comparatively large volume of air that these houses contain serves as a buffer against sudden changes in temperature.

If draughts cannot be avoided by this step, it may be necessary to baffle the air inlets to direct the air upward, to reduce the air velocity by sacking or fine mesh netting, or to install a type of insulated kennel for the pigs to sleep in.

In some localities where farmers are using the modified Harper Adams fattening house the protected exit from house to yard serves as a funnel through which wind moves at a high speed to create very unpleasant conditions inside. The presence of nearby obstacles may channel the wind in this fashion.

The second method of reducing condensation demands more effective insulation. Pig houses in New Zealand have little insulation compared with those of the same type in North America and Europe. However, though many houses of the enclosed or semi-enclosed types could be improved by adding, say, a lining of timber, hardboard, or softboard to walls and roof, further insulation may not be practical.

The third approach in reducing condensation is that of eliminating as much as possible of the liquid responsible for this water vapour within the house. Ways of doing this are:

1. Enclose only the sleeping quarters.
2. Enclose only the sleeping quarters and trough area.
3. Ensure that the fall on the floors is adequate to give a good run off of liquids (½ in. per foot on feeding and dunging areas).
4. Direct waste liquids through the wall from each pen via a baffled outlet rather than allow them to run through each pen the full length of the building. (This also reduces the spread of disease.)
5. Where there is an outside yard, train the pigs to urinate outside.

Condensation on walls and roofs is due to inadequate ventilation and insulation and is really only a problem when pigs are mainly or wholly confined indoors.

Two questions now arise: (a) How important is this fault in housing? (b) Why not use a house which provides sleeping accommodation only?

(a) The answer to (a) is that a foul, oppressive, and damp atmosphere develops when ventilation is insufficient. The ammonia seems to weaken the respiratory organs of the pigs and so renders them more susceptible to disease in associated organs. Beds may be difficult to keep dry. Decay of timber can be hastened.

Pigs do better where relative humidity is about 70 per cent than when it is higher. The desirable level may be achieved by increasing ventilation and maintaining temperature between 50 and 60 degrees F., when condensation will be negligible. A reasonable balance between temperature and humidity is the aim.

(b) By enclosing only the sleeping quarters of each unit management is simplified and expense of building reduced generally. This is a thoroughly practical method of raising pigs. Though overseas reports indicate that worthwhile savings in food can be obtained by raising pigs in a controlled environment, no information is available on this aspect for New Zealand conditions.

Unless management and stock are of a sufficiently high standard, pig houses designed to give a large measure of control over environment may not be a sound investment. However, as shown earlier, some districts warrant, and some farmers prefer, an enclosed piggery to give adequate protection against inclement weather, and a design such as the barn piggery has distinct advantages in this respect.

Farrowing Accommodation

The round farrowing house was designed at the Department of Agriculture's Ruakura Animal Research Station to reduce losses in piglets from overlying by the sow after a Dominion survey of losses on farms. Though the principles employed in the houses are sound and a definite reduction in losses has been achieved at Ruakura, Massey Agricultural College research piggery, and the New Zealand Pig Producers' Council breeding centre at Korakonui, near Te Awamutu, farm results have not been very encouraging. Relatively few farms are yet using round houses and no records for a large number of farms are available for comparison with those assembled at the experimental centres. Without these a true picture cannot be shown.

As the farmer sees it, the pigs at these centres are getting specialised attention which ensures that factors likely to cause death or ill health in piglets are controlled to a greater degree than is possible on farms. There is much room for improvement in methods of housing and managing pigs on farms, but there is a practical limit to what can be achieved. This is demonstrated in the following table by the fact that the breeding centre at Korakonui, run on commercial lines and using round farrowing houses with heat lamps, records 3.3 per cent losses by overlying in 75 litters compared with ½ per cent at Ruakura for a large number of farrowings.

	Type of house	Piglets overlain per cent.
Ruakura A.R.S.	Round house with lamp	0.5
	8 ft. x 8 ft. house with lamp	6.0
Korakonui breeding centre ..	Round house with lamp	3.3
Farm losses survey	Various types	7.0

Ideally the round farrowing house requires a heat lamp to supply additional warmth during the first week after the sow farrows. Very few farmers, however, have the power on at the piggery or consider that it is warranted. Consequently round houses are being built and used on farms for farrowing with no supplementary heat. Bedding in the form of shavings is rarely or scantily supplied for various reasons.

Observations at Ruakura during chilly nights of sow behaviour in round farrowing houses with heat lamp on suggest one reason why farm results may not be encouraging. It was noted that a number of the sows chose to lie with their backs near the heat lamps with the piglets near the outside walls between the sows' legs. If a cool draught round the wall caused a sow to adopt this position, the piglets then become exposed to the draught. As supervised at Ruakura piglets may not suffer any ill effects, but under the usual farm management ailing piglets once chilled are more likely to be overlain.

The above reasons are not advanced in condemnation of the round house, for its principles are sound, but the design does not appear to be entirely satisfactory for farm use. Various designs and adaptations of orthodox houses are in use and it is suggested that those approaching the following specifications will give best results.

(a) A capacity of between 200 and 250 cub. ft.

(b) **Either:** Insulated outdoor units with a fixed roof, an average internal height of 4 ft., and provision for restricting ventilation via the entrance.

Or: Units within an enclosed building and having approximately 3 ft. side walls which support adjustable insulating panels or material, the front of the sleeping quarters closed off as required to prevent draughts.

(c) A partially enclosed safety zone having reflective insulation as lining with provision for a heat lamp if this can be installed.

Creep Feeding

An essential part of litter management is to provide a creep trough at which the suckers can obtain extra food free from interference by the sow. The creep can be inside the house adjacent to the sleeping quarters but will be quite satisfactory outside if protected from the weather. Internal creeps, if neglected, encourage messing in the wrong place.

For convenience a self-feeder which holds sufficient meal for a week or more can be used. A creep milk or whey trough is not now recommended, unless the owner can ensure that it is kept scrupulously clean, as it will become filthy if neglected. The suckers will feed from the sow trough, which is normally well cleaned by the sow.

Weaning

Weaning is a critical phase in the pigs' life. At this time warmth is most important and provision must be made by the means described in this article to ensure that they are able to keep themselves warm on their sleeping quarters.

Fattening Stage

The fattening house should enable the pigs to maintain a temperature of 60 degrees F. over the bed with as little variation as practicable. By effective application of the principles dealt with in this article this requirement can be met more easily than that for smaller pigs. However, for pigs being fattened and breeding stock some means of cooling the air, for example, by evaporation from a water spray is necessary in hot weather.

The Home Garden in September

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

THERE is no urgent need in most districts to sow or plant a large assortment of main-crop vegetables in early September, though ground conditions usually improve during the month to the extent that quite extensive sowing and planting of hardy vegetables can be done.

IN most southern districts or where the last killing frost may occur as late as the first or second week in November, there is no hurry yet to sow seed of celery, cucumbers, marrows, pumpkins, and squash for growing outdoors. Early planted potatoes will need protection from frost, and an early or successional planting can be made. Tubers can still be set out to green and sprout in a light airy frost free situation, preferably where temperatures do not fall below about 40 degrees. Except in favourable situations the planting of the main potato crop is best deferred until about the first or second week in October.

SOW NOW *

Under Glass:

Tomatoes Celery or celeriac Cucumbers Melons Egg plants Peppers	Early or late September according to district

In the Open:

Brussels sprouts
Leeks
Cauliflowers
Summer cabbages
Spinach
Silver and perpetual spinach beet
Kohl rabi
Mustard greens
Carrots
Parsnips
Beetroot
Radishes
Peas
Broad beans (late sowing in southern districts)

PLANT OUT

Silver beet
Lettuces
Summer cabbages
Cauliflowers
Potatoes (main crop in warmer districts only)
Rhubarb (in colder districts)
Jerusalem artichokes

* The above list is not a comprehensive one, but contains recommendations that will ensure a good start to gardens without the risk of losing some species by unseasonable conditions.

In exposed situations broad beans may require support, which can be provided by string tied at suitable heights to stout stakes placed at 5 to 6 ft. intervals along the sides of the bean rows.

In many districts peas and lettuces will need protection from birds. Wire netting guards or cotton stretched above the rows are effective. A dusting of lime, superphosphate, or sawdust is occasionally satisfactory with peas.

Soil Improvement

Soil must be in good condition for the satisfactory growth of most vegetable crops and one of the problems which arise when the planting and sowing season starts is that of manuring and improving the productive capacity of the soil. The addition of organic matter is essential to keep production high on most home garden soils.

Organic matter is the decayed animal and vegetable matter which gives soils their dark colour and it is the key to the fertility of garden soils. It is being lost continuously in most home gardens owing to the action of fungi and bacteria and to some extent soil animals. Microbial activity is increased enormously after fresh supplies of organic matter are added to the soil and is further encouraged by warm temperatures, aeration of the soil, and adequate soil moisture. Cultivation also seems to encourage microbial activity, though exactly why is not known.

Many of the older home garden soils that have been cropped for perhaps 15 to 20 years or more are in poor condition for growing vegetable crops, mainly because of lack of organic matter, as relatively little has been done to maintain or increase the amount in them.

Too often the soil-improvement measures have been the addition of mineral fertilisers, such as sulphate of ammonia, or relatively light applications of organic manures, such as blood and bone. Green-manure crops can do much to build up the organic content of these soils.

The solution to the problem of improving the more intractable clay soils or excessively light soils and the older worked-out soils is the addition of organic matter such as farmyard manure, straw, compost, rotted sawdust, leaf mould, seaweed, and rotted stack bottom and the digging in of mature green crops.

In addition the texture of sticky clays usually can be improved to some extent by adding gritty material such as sand, which tends to improve drainage and aeration and make soils more open and easier to cultivate. However, a large amount is needed to alter the texture of the soil of even a moderate-sized garden.

In most districts sawdust is the cheapest and most readily available source of organic matter, though not the best. If large amounts of it are to be used, it should be rotted before it is applied to the land. On areas that are not too exposed sawdust can be used as a mulch up to about 3 in. thick, depending on whether there are plants in the area and their size.

Precautions with Sawdust

If too much unrotted sawdust is dug into ground that is to be cropped immediately, plants may suffer from nitrogen starvation and become pale and weak. This is because the very small organisms in the soil increase enormously as the sawdust decomposes and are competing with the plants for the nitrogen that is available in the soil. Plants affected by such lack of nitrogen usually recover if kept well watered and fed at weekly intervals with sulphate of ammonia at about 1 oz. to 2 gallons of water. For best results in adding organic matter containing much fibre (such as sawdust) to the soil it is advisable to apply additional nitrogen in the form of sulphate of ammonia.

Soils can also be improved if green or cover crops are dug in regularly, but such crops should be bulky. In heavy soils particularly they should be grown until they contain a great deal of fibrous matter. This when dug into the soil will not

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Mr. G. Arnot,
Dip. Horti. Sci. (Reading)

New Zealand's history of leadership in many aspects of modern farming, together with a greatly increased demand for advanced agricultural chemical products, had necessitated the establishment of a self-contained Shell Agricultural Division in the Dominion, said Mr. G. Arnot on his arrival from England.

Holder of the Diploma of Horticultural Science, Reading University, he takes up a new appointment as head of the Shell Agricultural Division. This follows 10 years with the Shell Group in England, West Africa and Belgian Congo.

Mr. Arnot considers that the New Zealand farmer's receptiveness to new ideas and modern methods of increasing production are among the special factors which make the Dominion an exciting prospect for anyone specialising in agricultural marketing.

Shell's role

The New Zealand Shell Agricultural Division, headed by Mr. Arnot, will be wholly devoted to the needs and interests of New Zealand agriculture. The introduction of the long awaited full range of advanced hormone weedkillers was only the first of many tasks facing the Division and he was more than happy to be associated with the decision to co-ordinate and "streamline" Shell's expanding services in the agricultural field.

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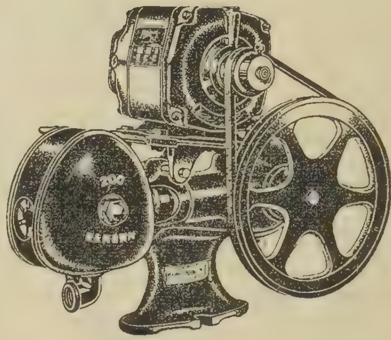

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[Green and Hahn

The addition of organic matter is essential to keep most home garden soils in first-class condition. The type of farmyard manure shown is excellent, but is not freely available these days. Alternatives are straw, rotted sawdust, seaweed, leaf mould, compost, rotted stack bottom, and dug-in green crops.

readily be dissipated, but will combine gradually over a period with the gritty and colloidal matter in the soil and form soil crumbs.

In many of the smaller home gardens the need for producing vegetables continuously makes it difficult to maintain the soils in good physical condition. For best results in these gardens it is imperative to add additional organic matter each year.

Successful commercial gardeners who cultivate small areas intensively are aware of the need to maintain the physical condition of their soils. Commercial growers almost invariably make heavy applications of organic manure for every second crop besides growing green crops whenever possible.

On larger commercial gardens the physical condition of the soil is usually maintained by frequent heavy green cropping. Alternatively on the larger holdings areas are sown rotationally in grass. With a grass cover the soil surface is protected from the erosive effects of sun, wind, and rain and a thick mass of roots permeates the top 18 to 24 in. of soil, improving the physical condition of the soil and providing a large amount of organic matter which will be broken down by soil organisms into available plant food and humus.

For the highest yields, however, even in soils well supplied with organic matter, it is usually best to apply also the more concentrated mineral or artificial fertilisers. Ideally the home gardener should make up his own combination of fertilisers to suit his particular soil and to suit the needs of the plants he intends to grow. However, this is usually impracticable, as most home gardeners grow a wide range of plants which vary in their demands for the major plant nutrients. There is, too, the difficulty of assessing how much of the various nutrients home garden soils need. Often different treatment is called for in different parts of the garden.

Results are usually satisfactory on soils adequately supplied with organic matter if the home gardener applies a good general or so-called complete fertiliser rich in nitrogen, phosphorus, and potash. One with a ratio of 1 : 2 : 1 which is likely to give good results on a wide range of soils can be made up as follows:

	Parts by weight
Blood and bone	7
Superphosphate	7
Dried blood	2
Sulphate of ammonia ..	2
Sulphate (or muriate) of potash	2

Leafy vegetables have a high nitrogen requirement, so that if the above mixture is used as a base dressing for them, it should be supplemented with side dressings of a combined fertiliser with a higher proportion of nitrogen.

When there is evidence of specific deficiencies further suitable materials can be added, for example, magnesium sulphate (Epsom-salt) for magnesium deficiency and molybdenised superphosphate for molybdenum deficiency, which causes whiptail of cauliflowers. Such mixtures can be dissolved and watered on as sprays or side dressings, according to which is most appropriate. The advice of the local Horticultural Instructor should be sought if a soil deficiency is suspected.

Fertiliser Quantities

Commercial growers usually calculate their fertiliser applications at a given number of hudredweights per acre. The more concentrated mineral fertilisers are usually applied at 1 cwt. to 2cwt. per acre, mixed fertilisers at 2 cwt. to 4 cwt. per acre or more according to need, and organic fertilisers such as blood and bone at up to ½ ton to 1 ton or even more sometimes. Home gardeners can assess comparative dressings per lineal or square yard from the following:

Broadcasting fertiliser: About ½ lb. per square yard (actually 7½ oz.) equals 1 ton per acre; 1 oz. per square yard equals approximately 2¾ cwt. per acre (actually 302½ lb.).

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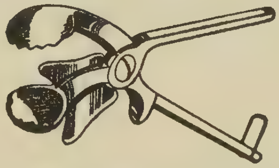

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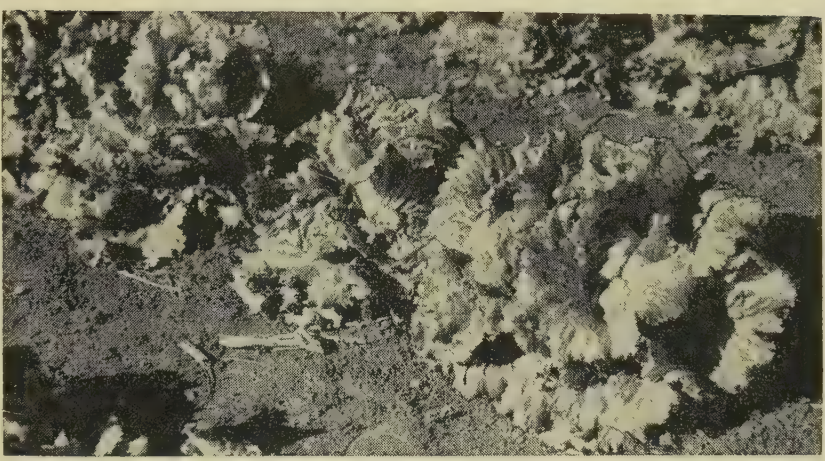

[*Green and Hahn*

Families today use lettuces at all times of the year and successional sowing is necessary to give a supply over a large part of the season. At this time of year seed can be sown or plants set out, but later when the soil becomes dry and the weather warm lettuces are better sown where they are to grow to maturity.

Fertiliser in bands: Applied in rows 2 ft. 6 in. apart 1 oz. to 9½ lineal feet of row equals 1 cwt. per acre. Applied to rows 2 ft. apart, 1 oz. to 12 lineal feet of row equals 1 cwt. per acre.

Beetroot

A successional or main-crop sowing of beetroot can now be made, though beet is a rather sensitive crop and temperatures should be reasonably high or a high percentage of plants is likely to go to seed prematurely. If plants are exposed for a month at temperatures of 40 to 50 degrees F., they are likely to seed the first year; even growing them at temperatures of up to 60 degrees F. is likely to produce seed heads the first year, though the plant is a biennial, normally producing its seed head the second year. Early sowings are therefore usually confined to the flat, deep oblate, or round types, which are harvested early.

Seed should be sown thinly to avoid the necessity for thinning. Beet are likely to be lopsided if crowded, but fairly large thinnings may be pulled and the tops used as beet greens. The method often practised overseas of thinning again later by pulling alternate plants and cooking them complete with tops as baby beets is not favoured much in New Zealand.

The flat and round types of beet quickly deteriorate if left after maturity, but as both the top and root of all types of beet wilt more quickly than those of almost any other root crops, handling and storage require special care. Early beets are generally used after they reach about 1½ in. in diameter and successional sowing is almost imperative where first-rate quality is required.

Beet is often judged to a great extent by its colour, and good varieties that should develop a rich colour sometimes fail to do so. This is especially disappointing where the roots are to be exhibited at a show and is usually caused by certain environmental conditions, the chief of which is temperature.

Sowing

Though it is not usually necessary for main-crop sowings, soaking the seed in water for 24 hours will bring about improved germination, which is particularly important with early sowings. Beet seed is about ⅛ in. across and a "seed" may be one or several seeds in a cluster or seed ball, depending on whether it was formed from one or several flowers. Even with thin sowing, therefore, there may be thick emergence because of the germination of several attached seeds.

Seed should be sown ½ in. deep in rows 12 to 15 in. apart and the roots thinned where necessary to 2 to 4 in. apart in the rows according to the size of the fully grown beet.

Soil and Manure

Soil and manurial requirements are generally similar to those for carrots, though beet is very much more sensitive to soil acidity. Lime, applied preferably some time before sowing, is usually necessary on soils not recently dressed. From 3 to 4 oz. per square yard worked in some time before sowing usually gives satisfactory results.

Too much lime should not be applied, as the element manganese becomes unavailable when the soil is very alkaline, and beets are very sensitive to manganese shortage. Beets suffering from manganese shortage can be recognised by the chlorosis (lack of green colouring matter) of their leaves.

Boron deficiency manifested by internal breakdown may also occur on alkaline soil in dry seasons. Beetroot requires plenty of moisture during growth. It transplants well if carefully lifted and replanted into moist soil, and if thinnings are replanted, they usually mature very little later than the rows from which they were lifted.

The highest quality beetroot are grown in the lighter soils. For best results heavy dressings of organic manure should be applied to the previous crop, though on poor soils moderate dressings of well rotted organic manure can be thoroughly worked in when soil is being cultivated to the fine tilth which is desirable before sowing.

The application of additional plant food depends on the soil. Soil requirements vary greatly, but if an artificial fertiliser is required, one with a ratio of 1 part of nitrogen, 2 to 4 parts of phosphoric acid, and 1 part of potash applied at the rate of 1½ to 3 oz. per square yard is likely to suit a very wide range of conditions. The situation for beetroot should be open and sunny, as it rarely thrives if shaded, even if soil conditions are perfect.

Varieties

Flat: Flat Egyptian. Short top (flat at the top or bottom with sides rounded): Crosby Egyptian, Early Wonder, Light Red Crosby. **Deep oblate to round globular or oval:** Crimson Globe, Detroit Dark Red, Greentop Bunching, Early Wonder, Crimson King. **Half long:** Half Long Blood. **Long:** Long Dark Blood.

Non-bleeding beet, which, as its name implies, does not bleed when cut, is increasing in favour, as it retains its colour even when cut into pieces before cooking.

Carrots

Carrots are high yielding and easy to grow, and to obtain a succession it is advisable to make several sowings. The housewife usually prefers young, medium carrots, though it has been proved that large carrots contain as much sugar and usually no more fibre than small ones.

The smaller intermediate or stump-rooted types are most popular and when sown thinly on light, free-working, sandy loams or peat soils do not require thinning. Where thinning is necessary it can often be delayed with advantage until the plants are large enough to be used in soups, salads, or stews. Where the carrot rust fly is troublesome care must be taken to refirm the soil after thinning. It is also advisable to water the remaining roots copiously and remove all traces of thinnings.

Soil and Manure

Like most fleshy, taprooted crops, carrots do well in a soil that received

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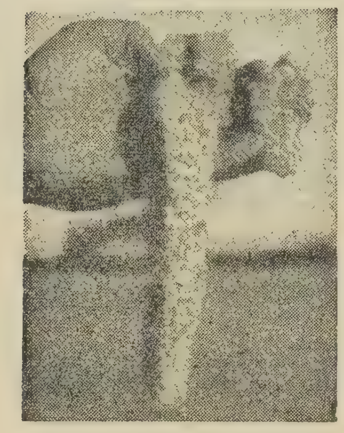

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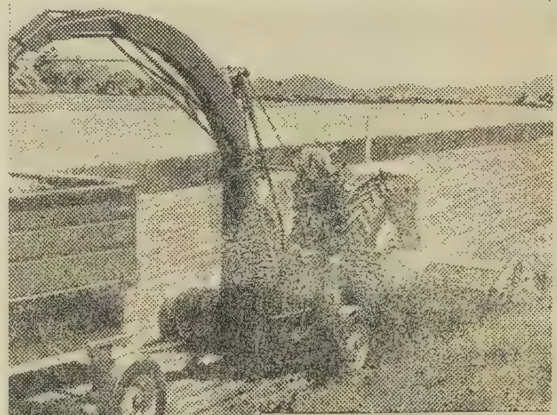

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a liberal dressing of organic material such as stable or farmyard manure for the previous crop. Commercially the best crops are usually produced on deep, sandy, or light loams well supplied with organic matter. Though carrots are tolerant of moderately acid conditions, where a deficiency of lime is suspected it can be remedied on most soils by the application of 2 to 3 oz. of lime a square yard.

Though carrots thrive in deep, rich, well drained and well cultivated soils, care should be taken when building up the humus content to apply only a limited amount of well rotted material so that the soil does not become too acid during breaking down and to ensure that the humus forms a homogeneous mass with the soil; otherwise misshapen or forked roots may result. For this reason, too, the soil chosen for carrots should be well worked up and if possible free from stones or lumpiness, because if the young taproot encounters a stone, a mass of fertiliser, or a very wet or very dry layer, its normal development is likely to be upset. Carrots are also likely to split on reaching maturity if (as often happens when the water-table is low) the soil becomes moist after being rather dry for a time. This tendency is usually accentuated by nitrogenous fertilisers.

When the soil is reasonably well supplied with organic matter, carrots respond well to moderate dressings of artificial manure; the dressing recommended for beetroot should give satisfactory results for carrots.

Sowing

Where drainage is poor it is advisable to make a raised bed. For convenience in cultivating and harvesting the bed should not be more than 3 ft. wide.

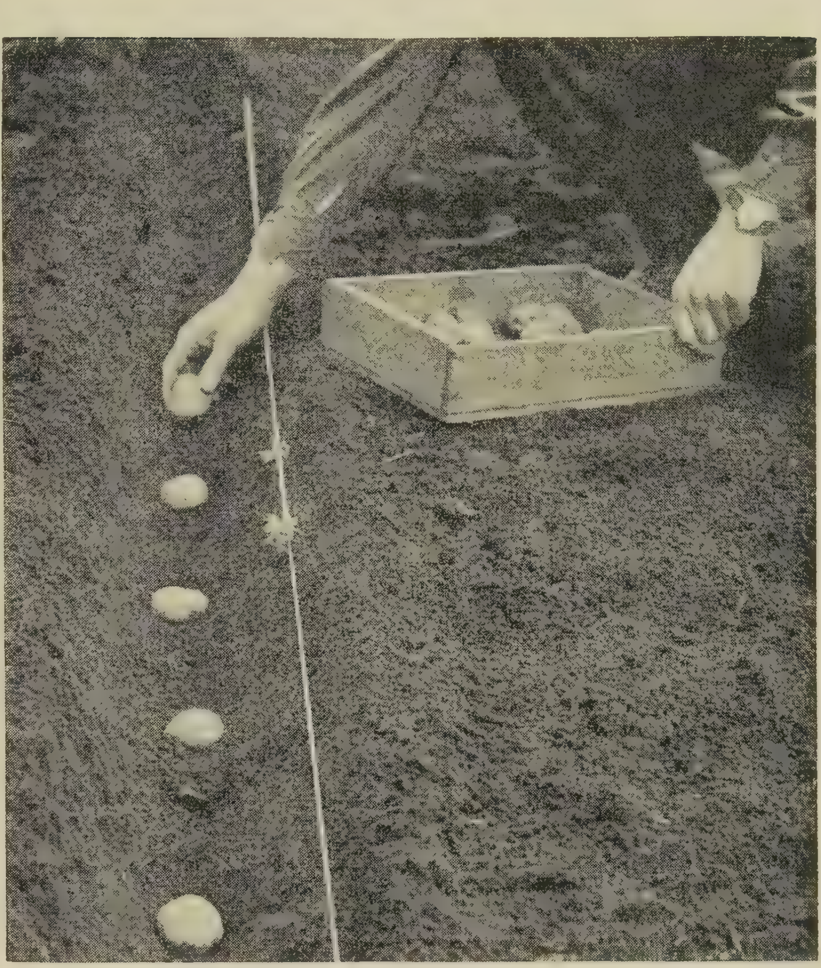
Seed should be sown ½ in. deep in rows 12 to 15 in. apart. In light soil thinning of most varieties is unnecessary. In heavier soils which tend to compact, or if large roots are grown, plants can be thinned 2 to 4 in. apart. A quarter of an ounce of seed will sow about 100 ft. of row.

Good varieties for the home garden include Nantes (light soil) and Morses Bunching, Red Cored Chantenay, or Taranaki Strong Top (other soils).

Celeriac

Celeriac or turnip-rooted celery is a good substitute for celery and takes less time and much less trouble to grow. It has a turnip-like root with a characteristic celery flavour. The roots mainly are used. They may be boiled, used in stews, or sliced and eaten raw as a substitute for celery in salads. Even the leaf stalk can be used when it has developed well.

Seed may be sown now, particularly as celeriac is not as well known as celery and few seedsmen sell plants, though most sell seed. Because it is very hardy, does not require to be blanched, and succeeds on a wide range of rich, moist, and well drained soils, celeriac deserves to be more extensively grown by home gardeners who like the flavour of celery.



[*Green and Hahn*

Most main crops of potatoes are planted in October, but a small early planting in September will provide some welcome "new" potatoes.

Seed is usually sown ½ to ¼ in. deep in rows 15 in. apart when the ground has warmed in late September or October. Plants can be thinned to or set out 6 to 8 in. apart in rows 18 in. apart, but they should not be set out deeply and should be liberally watered in dry weather. In very dry situations plants should be set out in shallow trenches to facilitate watering.

The soil should be rich so that plants make vigorous, continuous growth. During cultivation side shoots should be removed and the soil dragged away from the bulbous roots, which should be kept trimmed of all suckers, as they tend to cause unshapely development.

In districts which experience repeated severe frosts the roots can be lightly earthed up in autumn for protection, but lifting and storing are unnecessary except in heavy, poorly drained soil in exposed situations.

Varieties include Celeriac and Giant Smooth Prague.

Chinese Cabbage

Chinese cabbage is somewhat like cos or romaine lettuce, but the size of its oval, elongated head is usually nearer that of silver beet. It is sometimes called lettuce-cabbage, as the texture of its leaves is more like that of lettuce than that of an ordinary cabbage. Another name is celery-cabbage because of its flavour and because some of the forms resemble celery.

Chinese cabbage, which stores quite well after cutting, may be eaten either cooked or raw. The inside blanched leaves and heavy but tender midribs have a delicate celery-lettuce flavour.

The plant is tender and quick growing, the commoner varieties maturing in good conditions in about 70 to 90 days. It should be treated like lettuce, but as it grows much bigger, it needs wider spacing.

Chinese cabbage can be sown in spring, as it usually does well in the cool conditions then prevailing. Seed can be sown in good soil in a sheltered situation or in boxes under glass 3 to 4 weeks before plants are required for setting out. Spring or autumn sowing is best in most districts, because if plants are set out when the weather is hot and dry, growth is slow and consequently plants often fail to head properly, developing seed stalks instead.

Seed is best sown ½ in. deep in rows 18 in. apart in a moist, well drained soil that is very rich in humus. When the seedlings are 3 to 4 in. high they should be thinned or transplanted 12 in. apart in the rows.

Varieties include Wong Bok (Pao Ting), which is a short, quick-growing variety 9 to 11 in. high and up to 6 in. in diameter. Pe Tsai is a taller and thinner variety than Wong Bok with looser leaves. It stands dry conditions slightly better, but its flavour is not usually considered as good as that of the others. Chihli is a tall, early variety 15 to 20 in. high with a base diameter of about 3½ in.

Lettuces

Lettuces are among the most widely used of vegetables so successional sowings should be made from the time the ground is in suitable condition. If seed has not yet been sown, this should be done without delay, or if sufficient time has elapsed since the last sowing, a further sowing should be made. For lettuces grown early in the season, when conditions are cool, a variety such as Imperial Triumph or Imperial 615 (Neapolitan Winter) is especially suitable. Later, varieties such as Webbs Wonderful (New York 515) or Great Lakes can be used.

Seed can be sown ¼ in. deep in rows 12 to 15 in. apart in well drained, deeply cultivated soil of high humus content.

Early in the season lettuces can be transplanted successfully. They are usually set out 8 to 12 in. apart. When the weather becomes hot and dry it is better to sow seed thinly where the plants are to mature and to thin seedlings to 8 to 12 in. apart.

Onions

Onions are one of the few vegetables which usually do well following a member of their own family such as leeks or shallots.

Some experimental work indicates that they are likely to do best grown in soil on which grass has been grown, but that they are likely to be more productive following another crop of the onion family than following a crop of, say, cabbages. It is not recommended, however, that onions follow onions or leeks if there has been an appreciable amount of disease present. One advantage of having a special plot for onions is that the ground can be specially enriched and under such conditions onions are likely to do very well.

In the South Island and in districts where main-crop onions are usually sown in spring seed should be sown as soon as ground conditions are favourable. Though varieties and cultural practices have an important bearing on production, fairly heavy soils usually produce good-keeping but relatively slow-maturing onions and sandy soils quick-maturing onions that are generally of poorer keeping quality.

Onions require a slowly available supply of nitrogen, and on most soils crops will benefit from a heavy dressing of stable or farmyard manure applied in autumn and to which has been added (to balance its nitrogen and potash content) about 1/30 part by weight of superphosphate. If onions of good keeping quality are required, it is not advisable to apply in spring excessive quantities of organic manure which contain a considerable amount of nitrogen, as bulbs may be stimulated into excessive leaf growth and weeds are liable to be troublesome.

Few home gardeners are likely to have much farmyard manure, but available compost should be applied with a complete fertiliser at about 3 to 6 oz. a square yard. Because of the great variation in soils and their condition throughout New Zealand only local experience can indicate fertiliser requirements.

The seed-bed should be worked down to a fine, firm tilth and seed sown thinly ½ in. deep in rows 12 to 15 in. apart.

Good varieties include Ailsa Craig and Straw Spanish (both early) and Pukekohe Long Keeper (for storage).

Peas

Peas are a popular vegetable in the home garden though they are not high yielding in comparison with crops such as cabbage or carrots. To have peas at their best over a suitable period successional sowings are advised.

Peas do well in cool, well-drained soils rich in humus. As they repay good cultural methods, the ground should be deeply dug and manured, preferably some time before sowing, with organic material such as compost or farmyard manure. Before sowing, a complete fertiliser, or if the soil is in good condition, a dressing of 2 to 3 oz. of superphosphate to the square yard can be well worked into the soil.

If a shallow trench is first taken out and the seed pressed into the bottom of it 1 to 1½ in. deep (according to whether the soil is heavy or light), the plants can be earthed up conveniently as soon as they show a tendency to straggle or fall over between the rows. Dwarf varieties such as William Massey and Little Marvel can be grown without staking in rows 20 in. apart if they are kept well earthed up.

Rows of the mid-season varieties such as Greenfeast and Victory Freezer should be planted at least 3 ft. apart and require staking. Material such as brushwood, netting, or sticks can be used. Vines must be supported so that they will not provide a refuge for slugs, which eat the pods. Staking also prevents the pods from rotting through contact with the soil. The varieties mentioned are among the best. One pound of pea seed is sufficient for about 100 ft. of row.

Potatoes

In most districts it is too early to plant main-crop potatoes, though an early planting can be made if the home gardener is prepared to keep the tops earthed up while frosts are likely to cause damage. It is not necessary to green and sprout tubers before planting, but earlier crops can usually be obtained from sprouted seed.

Fertiliser

The fertiliser required for potatoes depends greatly on the amount of organic matter previously incorporated in the soil, but Department of Agriculture trials have shown that broadly a mixture (by weight) of 1 part of sulphate of ammonia and, according to soil type, 3 to 5 parts of superphosphate applied at about 1½ to 2 oz. per yard of row will give good results.

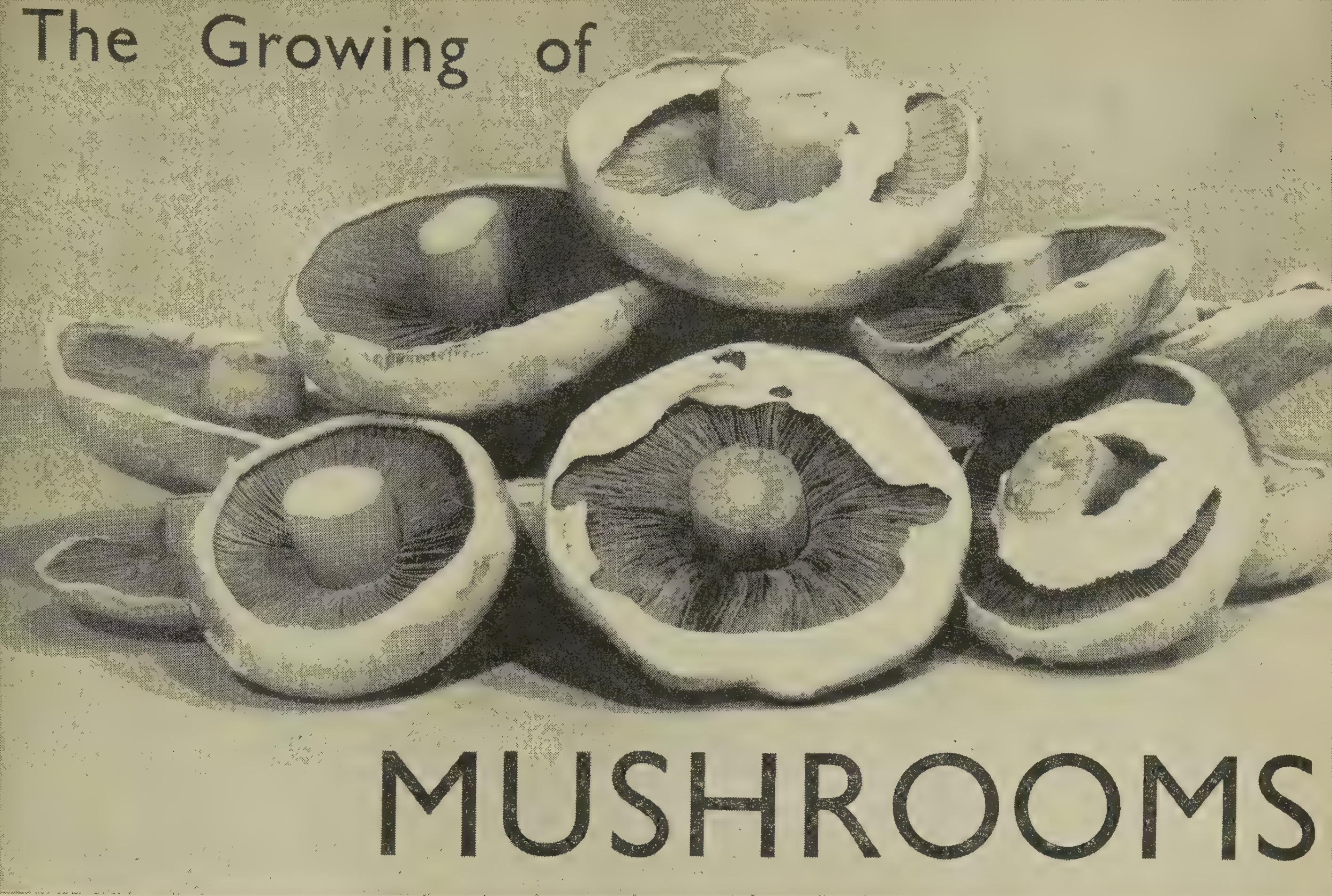
The addition of muriate of potash or sulphate of potash, preferably the latter, at about ⅓ oz. to a yard of row will give improved results on many soils and is advised for most home garden soils. Instead of superphosphate and sulphate of ammonia equal parts of superphosphate and blood and bone can be used.

Planting

The simplest way to plant is usually to open a trench about 4 to 5 in. deep and to dust the fertiliser along it. In the home garden rows are usually 2 ft. apart and tubers can be placed from 9 in. to 14 or 16 in. apart in the rows. The wider spacings are favoured for main-crop or very large growing varieties.

Though for early crops Epicure and Arran Banner are most commonly planted, numerous other varieties listed in good seedsmen's catalogues are suited to different districts. For example, Jersey Bennes is favoured in Otago.

The Growing of MUSHROOMS



THOUGH the mushroom is valued as an article of diet in New Zealand, few home gardeners have attempted to grow it. Its popularity and the quality of the produce that can be grown from spawn obtainable from most good seedsmen merit the attempt to grow it when suitable facilities are available. There are a number of wild species of edible fungi in New Zealand, but the cultivated mushroom is probably a variety of the field mushroom *Psalliota (Agaricus) campestris* and is related to the horse mushroom *P. arvensis*, though it is superior to both in texture and flavour and in its response to cultivation.

TOGETHER with yeasts, moulds, and mildews, mushrooms belong to that great group of plants known as fungi. The fungi as a group may be considered the scavengers of the vegetable kingdom, for they seize on all dead and decaying vegetable matter and soon reduce it to a condition in which it can again be utilised by plants.

Fungi which obtain their food from living plants or animals are called parasites, and those which derive their food from dead plant substances are called saprophytes.

Fungi cannot make their own food as green plants do, because they lack the green chlorophyll by which ordinary plants are enabled in the presence of sunlight to promote the union of carbon dioxide and water to form sugar, which the plant further builds up into starches and other substances for its growth. Fungi on the other hand are able to live without light.

What is commonly called a mushroom is not truly a vegetative body at all, but is merely the fructification (fruiting stage) of a fungus. As the mushroom fungus has no flowers, it produces no seed. It reproduces its kind by means of minute bodies called spores, which are formed on the gills under the "cap". The cycle of life of the mushroom fungus can be divided into three stages: 1 spores, 2 mycelium (spawn), 3 mushroom.

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

Spawn may be obtained from most good seedsmen in either "bricks" or in bottles. The bottle method of carrying spawn is more modern, and is claimed to give a product that is much purer and truer to name than brick spawn; in addition, because it is usually fresher and moister, it starts growing much more rapidly when planted and is less likely to fail.

Brick spawn is made up of hard, dry blocks of compost usually about 8 in. long by 7 in. wide by about 1½ in. thick and is full of threads of mushroom spawn.

Mushrooms are not easy to grow. Except for the experienced grower or the specialist the only sure way of growing them is the standard method, in which beds of fermenting horse manure are spawned under controlled and strictly hygienic conditions.

It is possible to grow mushrooms outside in open paddocks, but there is no certainty in the method. On occasions, however, if a good turf paddock is available, the method is worth trying on a small scale. The spawn can be planted below the turf either with or without manure, though there is more chance of success where manure is used. The manure should be prepared in the same way as for the standard-type bed. November to February are the best months, but in the north spawning could take place even later.

The usual method is to take out slices of turf about 1 ft. square with about 1½ in. of soil adhering to them.

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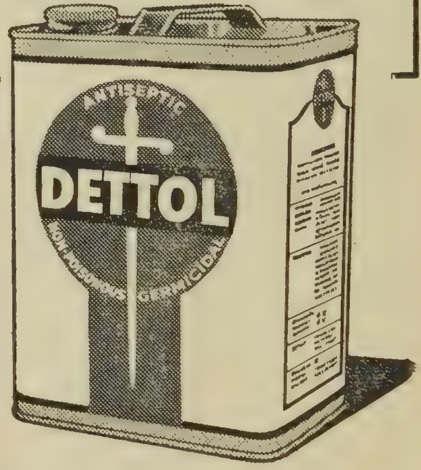

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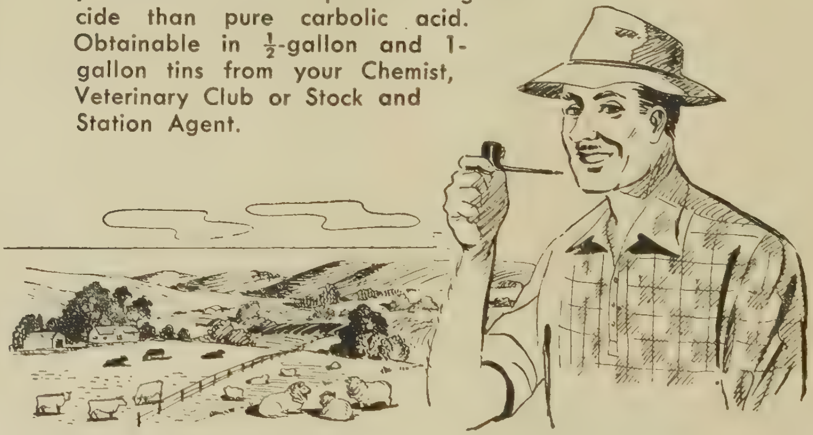

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[Green and Hahn

Mushrooms growing on an abandoned lawn.

About 3 in. to 4 in. of soil is removed and prepared manure is pressed firmly into the cavity. The manure should be spawned according to the spawnmaker's directions and the turf replaced and firmed so that there is no trace of its having been lifted.

The plantings should be not less than 2 ft. apart.

If spawning is followed by continuous dry weather, the spawned areas should be watered to keep the cut turf moist and alive, but where manure has been inserted water should be applied with discretion, for the manure underneath should not be made wet. Though much depends on weather and the condition of the turf, mushrooms may be expected in from about 6 to 10 weeks, but occasionally the period is longer.

Growing Mushrooms in Beds

The only reliable method of growing mushrooms is in properly prepared beds of fermenting stable manure, or specially balanced compost. Correct preparation of the material before it is made up into the bed is of great importance.

Mushrooms can be grown in cellars, wooden sheds, glasshouses, frames, stables, or almost any place where equable temperatures can be maintained. The building must be ventilated but free from draughts. Beds can be made outside in favourable weather. Worked-out mines, tunnels, catacombs, and quarries are also used overseas.

For the first few weeks after spawning it is not advisable to allow the temperature to drop below 50 degrees F. This is to ensure that the spawn runs freely in the beds. Once it has run the temperature can drop very much lower without doing any harm beyond retarding growth until the temperature again rises.

For best results temperatures should not rise above 70 degrees F. The higher the temperature is above 65 degrees the greater is the likelihood of moulds and rots developing and destroying the crop. Probably the ideal temperature is between 54 and 58 degrees F. Fluctuating temperatures are very harmful, and variation should not exceed 3 or 4 degrees on either side of this.

If a glasshouse equipped with hot-water pipes is available, the heat may be used if required, but kerosene or gas heaters are not recommended, as the fumes are often harmful. The air should preferably be fairly moist, but not excessively so.

Light is neither harmful nor beneficial, but sunlight is best excluded, as it is accompanied by some heat and thus has a drying effect. Fresh air is essential, but direct draughts must be excluded. The air should be gradually and constantly changed, but no special provision of ventilation should be necessary for mushrooms grown in small sheds or cellars; where larger areas are grown, overhead ventilators are usually preferred.

Material for the Beds

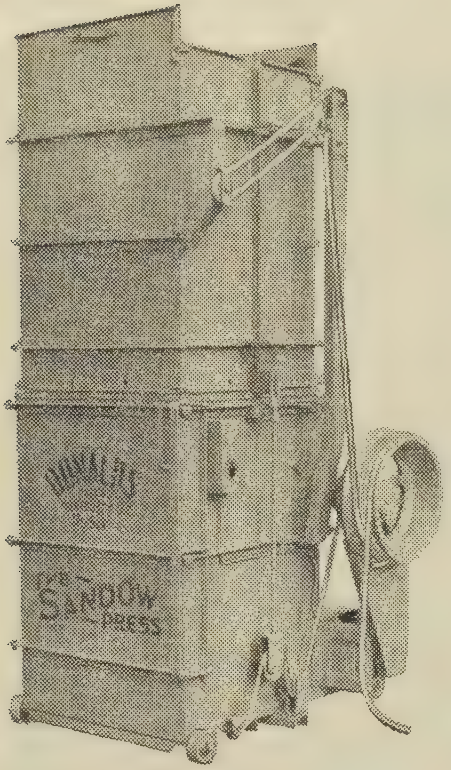
Most home gardeners in New Zealand will find that there seems to be no satisfactory substitute for horse manure. Composts of other material can be made up, but the difficulties in getting suitable material and composting it correctly are considerable.

If fresh horse manure that is not rain soaked is used, and certain principles are followed, its behaviour is usually consistent and so predictable. The manure should be clean and fresh; manure containing disinfectant or from horses under veterinary treatment should not be used, and the use of manure containing shavings, sawdust, or similar material is not advisable.

The best type contains a good proportion of straw litter—up to 50 per cent. Wheat or rye is usually preferred to oat or barley straw. The manure must be composted, that is, turned and mixed several times so that it heats and rots down gradually to the required even heat and texture. This mixing or turning should be done under cover and preferably on a concrete floor that has first been thoroughly cleaned and is situated where water will drain away from it; it should be well away from old rubbish heaps or material likely to harbour flies or other harmful insects.

The manure should first be tested for moisture content by squeezing handfuls from different parts of the heap. If the material binds together under pressure and only a trace of liquid is squeezed out, it is in suitable condition.

If it is dry, it should be watered with a can having a fine rose until it is moist but not wet. This is important, because if it is made too wet, heating is retarded and it is often difficult to dry it out again sufficiently.



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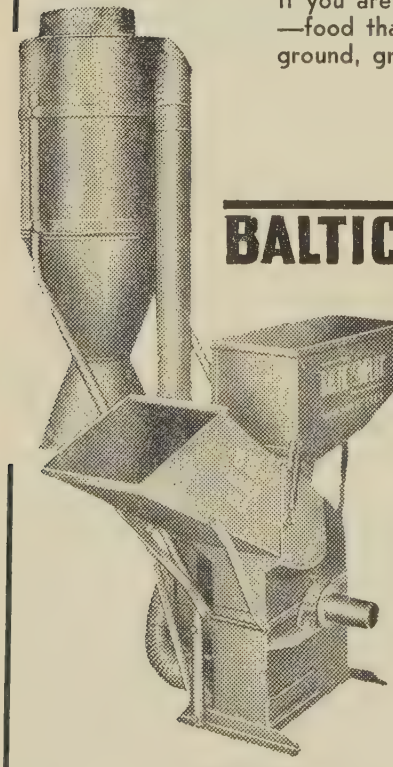

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The manure should first be forked over, thoroughly mixed, and foreign matter removed. Finally, it should be made into a deep, compact heap so that fermentation can take place. It should not be compressed, but limited consolidation will not have any adverse effect if the manure is not too wet and aeration is satisfactory. If it is necessary, the heap should be watered, preferably during the first or second turning. There should be enough moisture to allow fermentation to proceed through several turnings and yet leave the compost just moist at the final turning.

The ultimate aim should be a moist compost, and water should be added during turning at just the rate the manure can absorb it. The proper water content should be achieved as soon as possible during mixing. This is a difficult part of the composting process, as it is easy to over-water, particularly late in the composting. Too much water will retard or even stop the composting process.

If the compost has been forked over and heaped, it should be left undisturbed until fermentation has passed its zenith; this usually takes from 5 to 10 days and is shown by a slight sinking of the heap.

During fermentation the temperature in the heap may reach from 100 to 160 degrees F. As soon as the sinking that indicates that microbial activity is slowing down occurs the heap should be turned again. The material should be thoroughly shaken out and mixed and the new heap made so that the outside of the old heap is on the inside of the new and vice versa.

As turning proceeds some of the material within about a foot of the sides of the heap may have become dry and appear burnt, leaving a whitish ash. Material so affected should be thoroughly moistened and mixed throughout the heap.

The compost should be tested for moisture content, and when turning is completed it should again be heaped compactly and left to ferment.

Turning should be continued at intervals of 4 to 10 days or whenever burning occurs. The number of turnings required before the composting process is complete may range from three to six and depends on the state of the material.

Considerable judgment is required to decide what is the ideal condition, but when ready for making up into a bed the material should be warm, its colour should be a uniform blackish brown, and it should have a pleasant odour suggestive of mushrooms. The straw should break or sheer off cleanly when twisted in the hands. If a handful of compost is firmly squeezed, there should be sufficient moisture for it to bind but insufficient to wet the hand properly.

There is too much moisture in the compost if, when a handful is held close to the ear and squeezed, the movement of the juice can readily be heard. Too much moisture will adversely affect the growth of the spawn and may kill it if aeration of the bed is affected.

The addition of mineral fertiliser supplements such as calcium sulphate (gypsum) and in most instances superphosphate usually gives improved results: ½ lb. of ammonium sulphate, 1½ lb. of pure calcium carbonate (lime), and 1¾ lb. of gypsum to a cwt. of manure. is a useful supplement, particularly to excessively strawy material. Heavier dressings of up to 2½ lb. of gypsum and ¾ lb. of sulphate of ammonia can be applied with advantage in some instances, but cropping may be delayed during the first month, with, if too much has not been applied, increased yields subsequently. Over-fertilisation is, however, to be avoided.

The good synthetic or horse manure compost should have a total nitrogen level of about 1.5 per cent on a dry weight basis. This makes for rapid composting.

Synthetic Composts

The difficulty in obtaining suitable animal manure has led to the development of synthetic composts of which there are several recognised formulas available.

An American compost is as follows: half of crushed corn cobs, a quarter of hay and a quarter of legume straw such as lucerne, clover, and peas, to which is added per cwt. 1 lb. of muriate of potash, 2½ lb. of calcium sulphate (gypsum), and 1½ lb. of nitrate of ammonia. Composting is carried out as with horse manure, though more turns or mixings may be needed and heating may be slower. The moisture content of the heap should be built up to about 65 per cent and then the supplements added, perhaps in two mixings.

Synthetic compost is usually dark and of good water-holding capacity but more tough than compost from horse manure. Trace elements are sometimes added.

A British formula uses straw as the basic material. Straw is wetted by bales being stood compactly one on top of another on end or on edge in such a way that water can be dripped from above, preferably from a sprinkler so that the droplets fall evenly over the top surface of the upper bales and percolate evenly through the heap.

The straw can be allowed to ferment for 7 to 14 days in the bales after wetting by the bales being stood compactly and covered with a tarpaulin. It can then be shaken out and wet again if necessary as for horse manure and during the process an activator made up of sulphate of ammonia, superphosphate, and sulphate of potash with a nitrogen-phosphorus-potassium ratio of about 17 : 2 : 1 should be added at about 22 lb. to each cwt. of straw.

Straw cut to 6 to 12 in. is easier to handle than long straw. Trace elements are also added, particularly if no animal manure is available, and after the first breaking down of the fibre 3 to 3½ lb. of gypsum per cwt. of dry straw should be added. Turning should be done weekly and composting should be complete in 4 to 5 weeks, when the straw should break down readily.

Other Animal Manure Composts

Pig, sheep, poultry, and cow manure can be used instead of horse manure or mixed with horse manure, but the behaviour of such materials during composting is more difficult to predict than that of horse manure and consequently correct composting, a matter requiring considerable skill even with horse manure, is made more difficult.

The following ratios of manure to dry straw, if composting and fertilising are carried out as recommended for horse manure, can usually be expected to give fairly satisfactory composts, though much depends on the quality of the fresh manure: Sheep manure 4 : 1, pig manure 3½ : 1, cow manure 5 : 1, and poultry manure 2 : 1. There is liable to be variation in the manurial content of each different consignment of animal manure and usually the proportion of straw to manure differs. Experience is therefore necessary in assessing the composting possibilities of a good manure mixture.

Types of Beds

Mushroom beds may be either flat or ridged, or they may be made up on shelves or in boxes. Ridged beds are suitable for both inside and outside production. Boxes should be not less than 10 in. deep and 2 ft. long by 18 in. wide. To facilitate picking flat beds should not be too wide. Laid down in summer, they need not be more than 8 in. deep, but under cool conditions or in cold frames it is better to use a depth of 10 in.

Ridged beds have sloping sides and in cross section are usually in the form of a triangle or a trapezium. They can be of any length, but when built outdoors should not be closer than 3 ft. 6 in. between the ridges, for when they are finished they must be coated with about a foot of straw, which blocks up any narrower pathway. They should be about 2 ft. 6 in. wide at the base and 2 ft. high, and the top, if flattened, should be about 6 in. wide.

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It is essential that the land on which mushroom beds are built should not at any time be wet and if necessary the beds should be built on planks raised above the ground or on a firm base of open material such as coke or shingle. The position of outdoor beds should be changed each year.

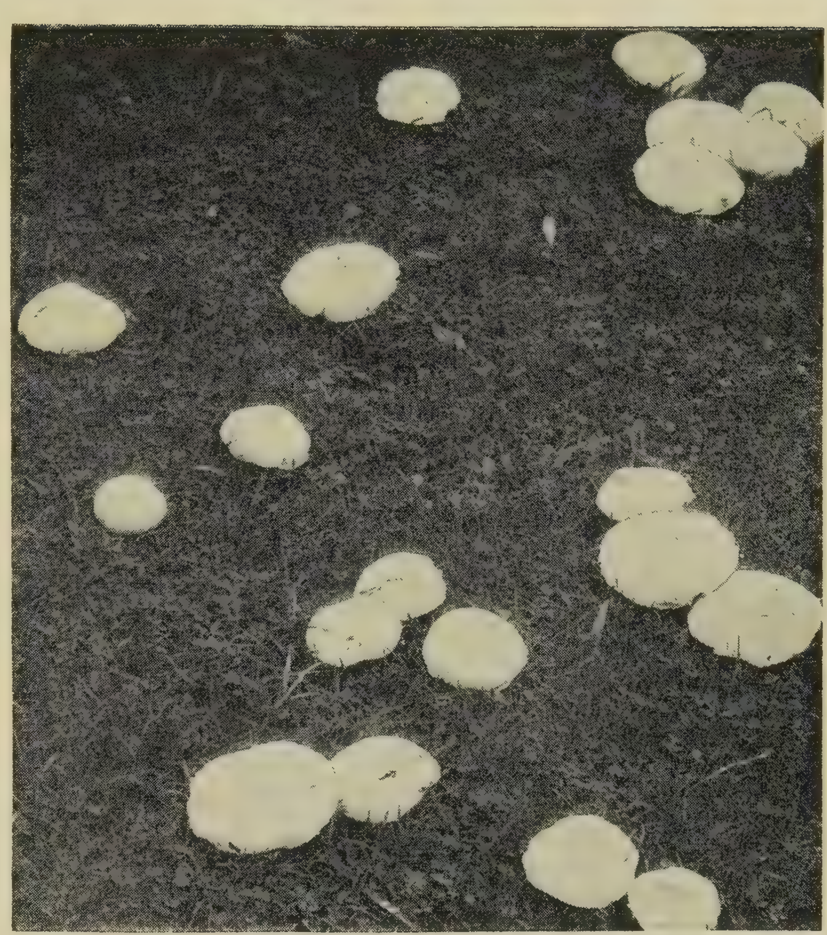
Before inside beds are laid down it is advisable to clean the floor and walls thoroughly, preferably with a 2 per cent formalin solution. This should destroy the spores of any fungi which may be inimical to the growth of the mushrooms.

Beds are made by forking the prepared compost evenly into position in layers and firming by beating it down with a fork or by treading on a short board placed on the compost. If the compost is not too wet, the firming may be done gently with the foot. A 9 in. to 11 in. layer would be reduced after firming to from 6 in. to 8 in.

If a cold frame is used, the walls should be of good heat-insulating material such as brick, concrete, straw bales, or turf, and if there is no danger of flooding or seepage, more even temperatures can be maintained by excavating about 6 in. of soil and building the bed partly below ground level.

Frames can be ventilated in the usual way by chocking up the covering light during the day with a piece of wood. The sash or "light", however, should be kept covered with suitable insulating material such as a combination of straw and sacking to keep temperatures even.

If boxes or trays are being used, it is advisable, unless they are to be stored in sufficiently damp conditions, to put 2 in. of clean, fresh turfy soil in the bottom of each box to prevent drying out.



[*Green and Hahn*

A desirable type of wild mushroom growing on a rich turf.

Spawning

After the beds have been laid they should be left for several days. Outside beds should be covered with straw to prevent excessive drying and to keep off rain. The temperature should rise again quickly and at this stage it is necessary to use a thermometer, preferably a plunge one.

Internal temperatures of up to 140 degrees F. may be reached, and with ridge beds which have considerable bulk and where composting has not been correct it may be advisable if the temperature rises above this to make several holes in the bed to speed up cooling.

This practice is not recommended except in extreme cases, for the holes must be refilled afterward with clean, fresh, or sterilised soil and this sometimes presents some difficulty; the soil introduced is often a potential source of infection with undesirable fungi.

If the beds become too hot internally, they may dry out excessively or become too wet near the surface because of condensation of internal and perhaps external moisture. This can usually be controlled to some extent by covering them with straw or by giving added ventilation. Beds do not always cool evenly, but if, after testing, the temperature is nowhere higher at spawning depth than 70 degrees F., spawning may be started.

Instructions for spawning are given by the maker with each package of spawn and should be followed closely. The usual practice is to insert pieces of spawn about 10 in. apart in a diagonal pattern all over the bed, each piece being placed at a depth of from ½ in. to 2 in. (according to the maker's instructions). A little of the compost should be removed each time and the spawn covered so as to be in contact with the compost all round. When finished the beds should again be covered with straw.

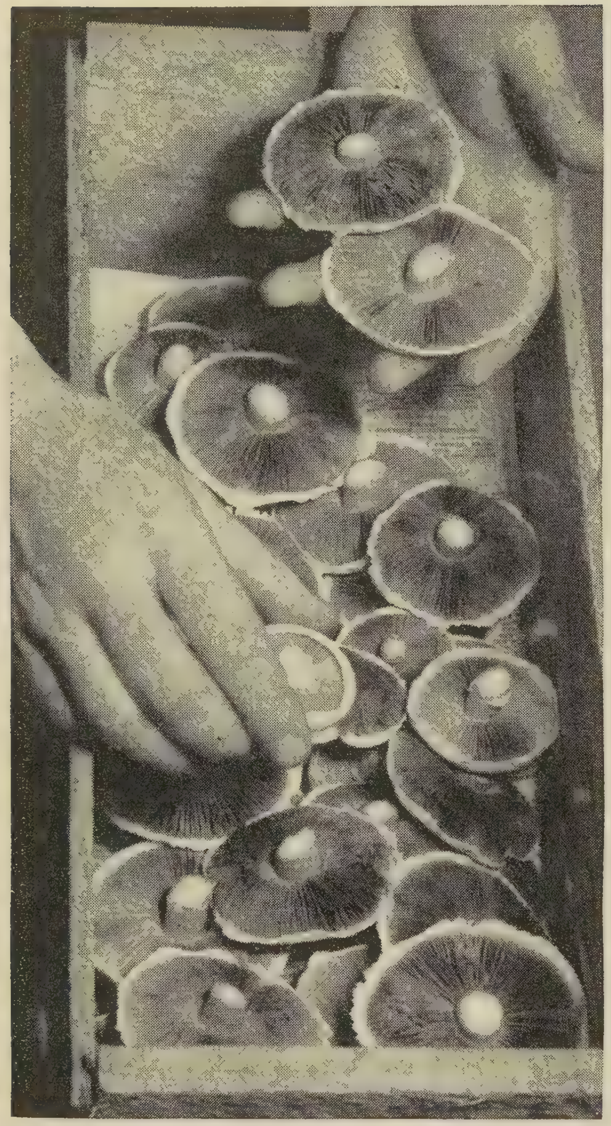
Casing the Beds

If the temperature of the beds and air has been kept at about 58 degrees F. or higher, the spawn should begin to run within 8 to 14 days; at lower temperatures the delay is likely to be greater.

If after carefully exposing the compost numerous strands of white cotton-like mycelium are seen developing in it, casing can begin. This is one of the most important operations in the growing of mushrooms.

Any type of soil is not necessarily suitable, though peat, types of rubble such as limestone, calcium sulphate (gypsum), and sandstone, and open types of clay and also ashes have been used successfully. They are not recommended except, initially, for small trial sections of bed where experience can be gained with them. Generally soil is most satisfactory.

Ordinary surface soil from the garden, especially if it is rich in humus, usually contains bacteria, fungi, or insects which are likely to be a cause of trouble later. If garden soil is used, it should be sterilised and poor in humus. Subsoil or soil from the



[*Green and Hahn*

Packing mushrooms for transit.

second spit is usually sufficiently sterile. If it is lumpy, it should be rubbed through a ¼ in.-mesh sieve. A light friable or sandy subsoil loam is probably ideal. Fine carbonate of lime should be added to raise its pH to about 7.

Flat beds or boxes should be covered 1 in. deep; ridged beds can be covered 2 in. deep at the edges, thinning to 1 in. at the top of the ridge. The soil, which should be moist but not wet, should be beaten gently and firmed evenly with the back of a spade. When the beds are cased the straw covering may be dispensed with, except on outside beds.

Attention to Ventilation

From the time the beds are nearing the bearing stage it is important that the supply of fresh air is adequate. Twenty changes of fresh air an hour have been suggested as a satisfactory minimum standard to aim at. Inadequate ventilation is likely to result in inadequate development of the mushroom heads. The movement of air should be gentle, as draughts are likely to cause cracking and scaling of the caps and discolouration of the mushrooms.

The best-quality mushrooms are usually grown at temperatures of 54 to 58 degrees F. and in an atmosphere that is damp but not excessively so. The air should be kept just moist enough to permit gradual evaporation from the beds. This can be achieved by attention to ventilation and if necessary by the "damping down" of the floor.

If the casing dries out anywhere, it should be lightly watered with a fine spray, but preferably only the casing should be watered. During the first 6 to 8 weeks after the bed has been cased, which is the earliest that mushrooms can be expected under good conditions, weekly watering with a fine rose may be necessary.

Salt at about 1 level tablespoonful to 2 gallons of water applied at weekly intervals if the beds are dry is said to be beneficial when cropping has begun. Outside beds usually take 8 to 12 weeks or longer to come into bearing. Other factors being equal the temperature usually determines the period taken.

Harvesting

Mushrooms first appear in small clusters over the points at which the spawn was planted and later they should cover the whole bed. They should be picked daily before the "cap" is fully expanded, by twisting each gently so that the whole mushroom with its stem is cleanly withdrawn. No rubbish should be allowed to fall on the bed and trimming is best done elsewhere. All dead or dying mushrooms or mushroom parts should be carefully removed. After a mushroom or group of mushrooms is picked the fleshy stump should be removed and the hole filled with fresh casing soil.

A bed usually lasts 2 to 4 months and the total yield over the period varies from 1 to 4 lb. per square foot, though yields of up to 7 lb. have been recorded. For the home gardener 1 to 2 lb. per square foot could be considered very satisfactory. Mushrooms usually appear in weekly flushes.

At temperatures of 60 degrees F. and higher production is usually heavy, but lasts for only about 2 months; at such high temperatures the mushrooms usually grow too fast and quality is affected. At 50 degrees, on the other hand, though production over a given period will be lighter, the beds may continue to yield for 4 months or even considerably longer.

Insect Pests and Diseases

Millepedes, woodlice, spring-tails, mites, and the larvae of various flies are all injurious to the mushroom at various stages of its development; a number of fungous diseases are also liable to be troublesome.

Hygiene is the most important factor in combating both insect pests and diseases. Enclosed areas where mushrooms are to be grown should be thoroughly cleansed and sterilised by washing with a 2 per cent formalin solution or fumigated by closing the place and burning flowers of sulphur (also known as ground or sublimed sulphur) at the rate of 3 lb. to 500 cub. ft. of space.

As turning proceeds care should be taken to include all scraps of manure in the heap so that they are subjected to the heat arising from fermentation. Scraps of manure left in corners or adhering to walls provide hatching grounds for the eggs of many species of insects which are easily killed if included in the fermenting heap. Just before casing the beds it is a good plan to dust pyrethrum or lindane powder over them if insects are present. All refuse should be gathered and destroyed.

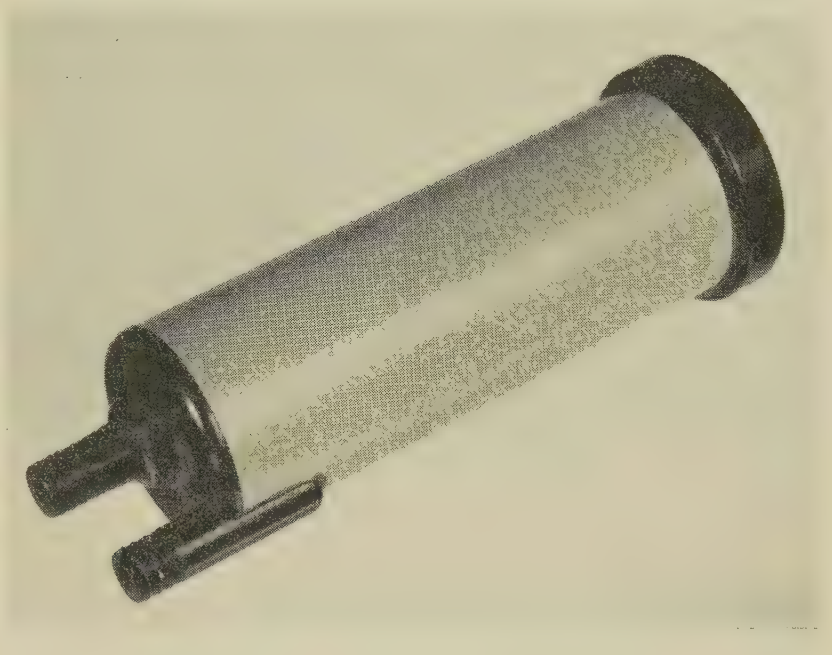
Fine-mesh wire or cheese cloth over windows and ventilators is effective in excluding insects and subsequently most insects can usually be controlled by spraying lindane lightly, a sprayer giving a high degree of atomisation being used, as there is a risk of tainting the mushrooms if appreciable spray residue falls on the beds.

New Developments in Cowshed Hygiene

By W. G. WHITTLESTONE, formerly Senior Principal Scientific Officer, Department of Agriculture Ruakura Animal Research Station, and M. J. McFETRIDGE, Supervisor of Farm Dairy Instruction, Department of Agriculture, Hamilton

INTERESTING new developments that have a bearing on the maintenance of hygiene in the cowshed are reviewed in this article as a guide to those farmers who might find it hard to differentiate between worth-while innovations and those that are just "sales talk".

AMONG these innovations are new antiseptics, dispensable teat cups, new types of milk pipe unions, and improved insulation for hot water containers.



A plastic teat cup with an inflation which is an integral part of the cup.

Iodophor Antiseptics

During the past few years a new type of antiseptic has been developed in America. It is based on a sort of chemical union between iodine, which is a very well known antiseptic, and certain new wetting agents or detergents. These peculiar compounds are called iodophors. They have all of the antiseptic action of iodine, slightly improved because the iodine does not evaporate from iodophor solutions and because the wetting agent enables the iodine to penetrate into crevices. In addition, these compounds have some detergent properties. However, they cannot be regarded as a substitute for a good detergent, and must be thought of as antiseptics or sanitisers.

Iodine is like chlorine in that it kills bacteria quickly and kills practically every kind. Like chlorine, it is used up by contamination. However, chlorine solutions give no indication of their going out of action. Iodophor solutions, on the other hand, lose their colour. At the concentration used for cowshed hygiene the iodophor solution is a light amber colour. If it becomes contaminated by milk, the colour disappears and the farmer knows that it is no longer active.

Field tests of the iodophors indicate that iodine antiseptic is as effective as three times the concentration of chlorine. Thus 50 parts per million of iodophor will be as good as 150 p.p.m. of chlorine. Recent field trials with iodophor solutions used at 50 p.p.m. as a pre-milking rinse indicate that it is very effective for eliminating bacterial build-up in the milking machine. Over the past season it has been found that if farmers have had trouble with grading and their machines have been rinsed with iodophor solution just before milking, contamination has always been eliminated and there has been an immediate improvement in the quality of the milk. Thus it would seem that the iodophor or iodine preparation used in these trials is a satisfactory pre-milking rinse.

Overseas studies suggest that iodophor solutions at 50 p.p.m. also make a very satisfactory udder wash in place of chlorine or a quaternary ammonium compound.

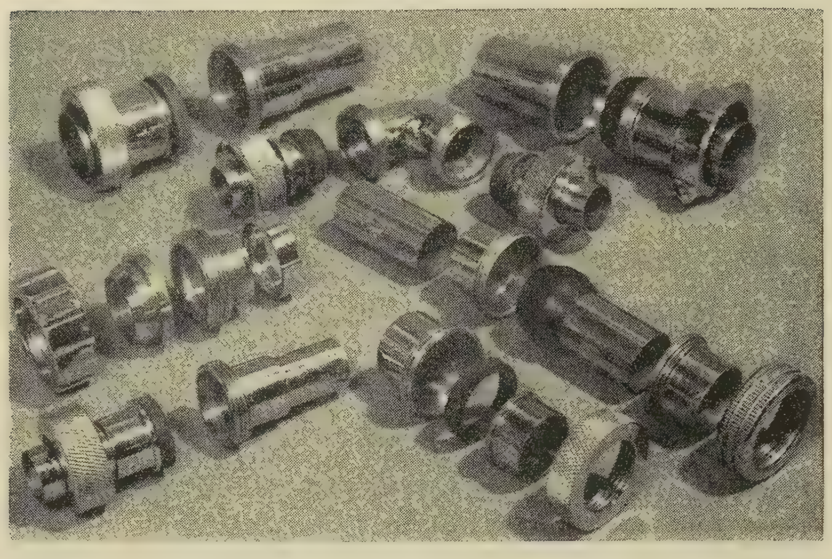
Plastic Teat Cups

A recent interesting development is the concept of the teat cup as a dispensable unit. This unit consists of a plastic cup case with a soft moulded inflation sealed into it. The inflation is guaranteed to have a life of one year and is made of a fat-resistant synthetic rubber. The illustration above shows such a cup after 6 weeks' use in an ordinary shed, but in this case the soft inflation used was not of a durable type and the cup had to be withdrawn because the inflation was nearing the end of its useful life. There was, however, no sign of any wear in the cup case despite the fact that it had been dropped on the floor and stamped on by cows on a number of occasions.

There would seem to be little doubt that this type of milking unit with a guaranteed life of a year would have a number of attractive features. The farmer would not have to remove inflations every few weeks, as he would if he used soft inflations. Furthermore, he would start every season with new cup cases, thus being quite sure of a year's reliable performance from the most important part of the milking machine, the teat cup. Present indications are that this sealed milking unit will cost the farmer little more than the types of cups at present in use when the overall life of the cup case is considered.

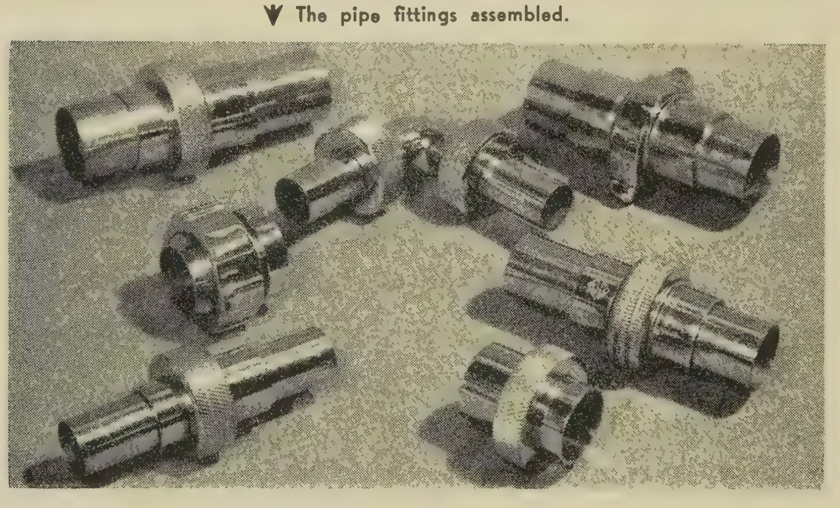
Unions of Milk Piping

Some unions for connecting milk piping on milking machines are unsatisfactory because they become contaminated between the rubber ring and the metal, a point of contamination not seen by the farmer unless the piping is dismantled. Some alterations therefore have been made which will make a more satisfactory joint and at the same time will be easy to dismantle. The new unions (see illustrations on page 154) give metal-to-metal joints and leave no hidden recesses



Milking machine pipe fittings dismantled.

▼ The pipe fittings assembled.



which can become contaminated. These unions will become standard equipment for new machine installations, and farmers whose present machines feature a metal sleeve and rubber ring combination union would be well advised to inspect the new type, which can be fitted to most existing machines.

Circulation Cleaning

As indicated in an article by D. S. M. Phillips in the July 1954 "Journal" circulation cleaning is inherent in the Ruakura milking machine and the system can readily be applied to conventional installations. A very simple arrangement for supplying circulation cleaning to an ordinary plant consists of a ⅝ in. plastic pipeline running along the shed above the milk line or air line and fitted with a T joint in each bail. A suitable dropper arrangement is provided and the inlet of the line is so arranged that it may be connected either to an udder-washing device or to the teat cup jetting devices.

The system works as follows: When the machine is set up for milking the inlet to the circulating tube is connected to the cooler exhaust or to the cold water tap. The udder-washing units are plugged into the droppers. Thus the circulating system supplies cold or warm water (if connected to the cooler) in every bail. This is an essential for the correct washing of the udders, and this system provides running water in every bail at a very low cost. When milking is complete the dropper of the circulating unit is plugged into the cup jetting device and the cups are fitted into the latter. When the cups have been so connected the milk taps are opened and cold water is drawn through the machine and exhausted from the releaser. This rinsing is continued until no trace of milk can be seen in the water coming from the releaser.

By this means the farmer can be quite sure that the machine is thoroughly rinsed before boiling detergent water is applied. This is perhaps the most important requirement of a good cleaning method. When the boiling water rinse is complete the circulation intake pipe is placed in a can of boiling detergent solution which is drawn through the plant and allowed to flow back into the can from the releaser, thus giving complete circulation. (Note: To ensure good cleaning and to prevent rubber seals becoming contaminated it is essential that the vacuum in the machine be maintained until the detergent solution has been circulated. This also applies to flush cleaning.) Finally a boiling rinse is drawn into the machine. It is recommended that a simple fitting be placed on the hot water boiler so that this final rinse can pass straight through the machine without being cooled through being placed in a bucket.

An interesting method of obtaining water for individual bails has been incorporated in a recently introduced milking machine which uses a water pipe connected to the outlet of the cooler as a source of water for udder washing and also to support the milk and air lines. This efficient system automatically supplies the farmer with udder-washing water as an integral part of his milking machine.

Water-heating Appliances

Over the years the use of electric hot water cylinders has become almost universal in cow sheds in New Zealand. Owing to the inefficiency and inadequacy of many electric water-heating installations it has become necessary to revise the standard of design and construction so that the water heaters will do the job required of them. The main alterations which have been made are an improved heat insulation to prevent heat losses in draughty positions. An enormous quantity of electricity is lost annually because of unsatisfactory insulation. Electric hot water cylinders will be marked with the draw-off capacity which is required for various-sized milking machines, and the heater will be constructed so that there will be no possibility of access of moisture to the lagging material. The material used in the construction of the heater is selected to give the greatest mechanical strength to withstand hard usage.

Propagation of Citrus Trees

By W. A. FLETCHER,
Citriculturist, Department of Agriculture,
Auckland

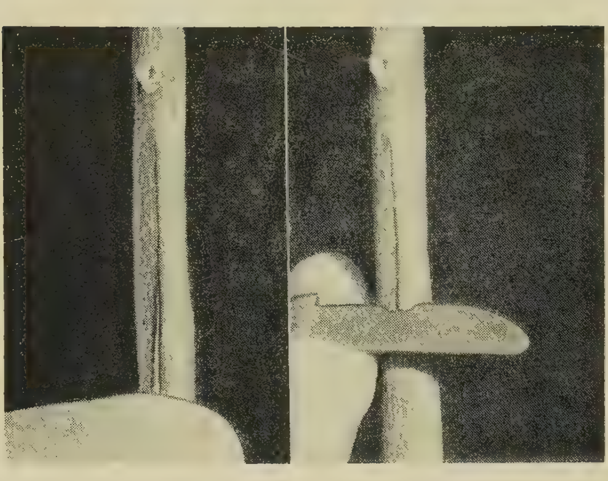
SUCCESS in citrus propagation depends on the use of the best and most suitable rootstock and budwood, and the first part of this article, in last month's "Journal", advised on varieties of citrus as seed sources, on budwood selection, and on nursery preparation. This, the second and concluding part, describes the budding operation, labelling of varieties, and later care of the budded trees.

TO avoid interference with the budding operation the stocks should be trimmed of all shoots and thorns to slightly above the point of budding. This trimming is best done at least 3 weeks before budding, or it must be done at the same time as budding, but this slows down the work. Late trimming causes the bark to tighten, making the stocks difficult to bud, and reduces the chances of success.

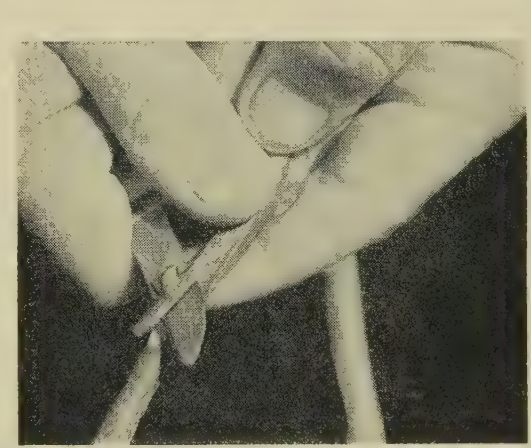
The style of budding used is the familiar "shield" method with an erect or inverted T cut through the bark of the stock for the insertion of the bud shield. Which way the T cut is made is perhaps more a question of personal preference rather than of practical importance, but it is claimed that the inverted T method keeps out moisture better. The erect T method is generally used in New Zealand.

Buds should be inserted in the stocks not less than 6 in. above the ground. Trouble from collar rot can result from low budding.

Neatness and speed are necessary for success in budding. If the inverted T method is used, a vertical cut about 1 in. long is made in the bark of the stock with a sharp, thin-bladed knife. Across the bottom of this cut and at right angles to it a second cut is made, forming an inverted T. This second cut is made with a slight upward slope to facilitate insertion of the bud. At the finish of the cut the knife blade is given a slight twist to open the bark at the junction of the cuts. Sometimes it may be necessary, especially for less experienced budders, to open out the

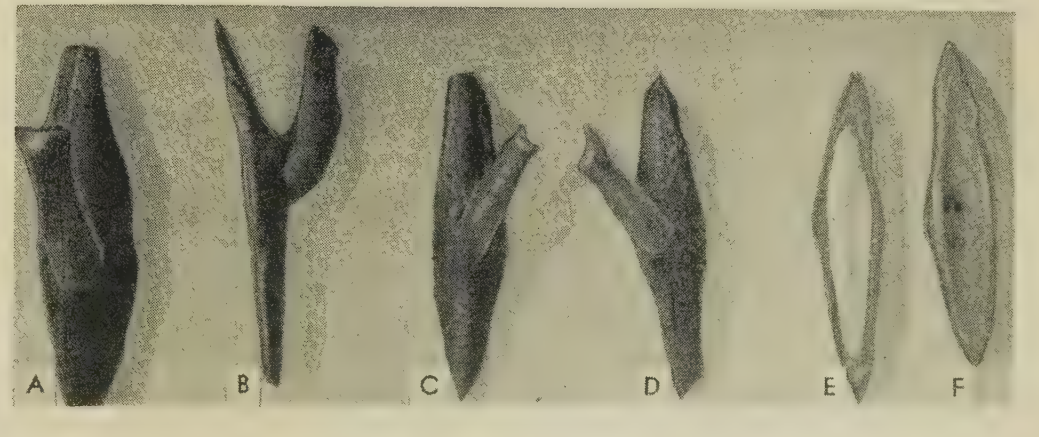


The first step in budding is to make a vertical cut (left) and then a cross cut to form a T incision. Here an inverted T cut has been made. The tilt of the knife is shown.



Cutting the bud from a budstick. The aim is to cut a thin, shield-shaped sliver of bark and wood about 1 in. long with a flat, smooth-cut surface.

Buds cut from a → budstick. A, C, and D: Front view of suitable buds. B: Side view of a bud shield. E: Rear view showing woody tissue intact. F: Rear view showing wood removed from bud.



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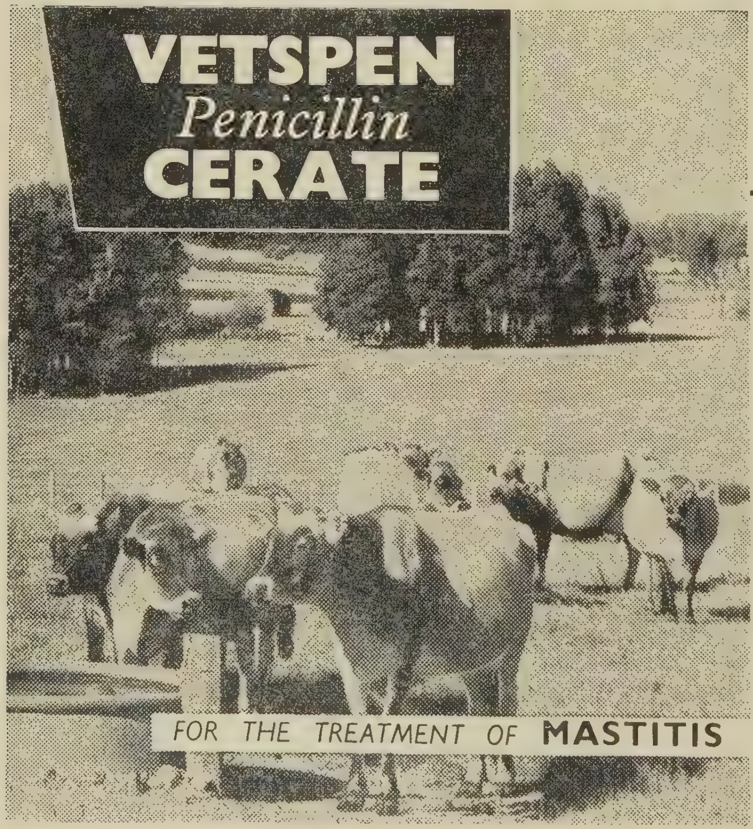

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edges of the cut with the point of the knife or the shaped bone end of a budding knife to make easy the insertion of the bud shield.

The bud is then cut from a budstick. The budstick is held with the upper end toward the operator and a bud is removed by a smooth, shallow cut starting below the bud and ending above it. The aim is to cut a thin, shield-shaped sliver of bark and wood about ¾ to 1 in. long with a flat, smooth-cut surface. Expert budders often remove the wood from the bud, but this is not necessary. Indeed, leaving the wood in the bud saves time and keeps the bud more rigid, making it easier to insert under the bark of the stock. Inexperienced budders should always leave the wood in the bud.

After it has been cut the bud is quickly inserted, right way up, in the incision in the stock and slid gently upward until it fits snugly in position.

The operation is completed by firmly wrapping the bud in place. Damp raffia, strips of rubber or polyvinyl chloride (P.V.C.) plastic film, or other suitable wraps can be used. Wrapping should be started below the bud to keep it in place and should be firm to exclude air and moisture.

Covering raffia-wrapped buds with heavy-grade petroleum jelly is very effective in excluding air and moisture and ensures better results, but it slows the budding operation considerably. Only early spring and autumn buds should be treated this way. Hot summer sun, by melting the petroleum jelly, can cause it to penetrate and injure the bark.

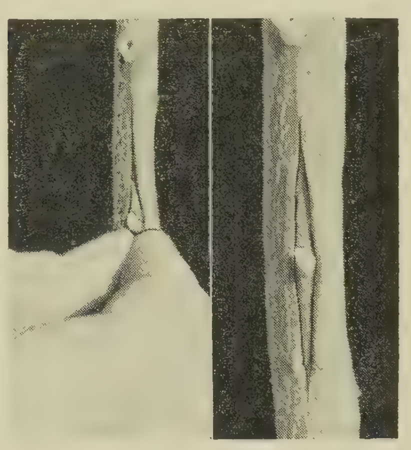
The eye of the bud is normally left exposed, but with transparent P.V.C. plastic film ties, buds can be covered completely.

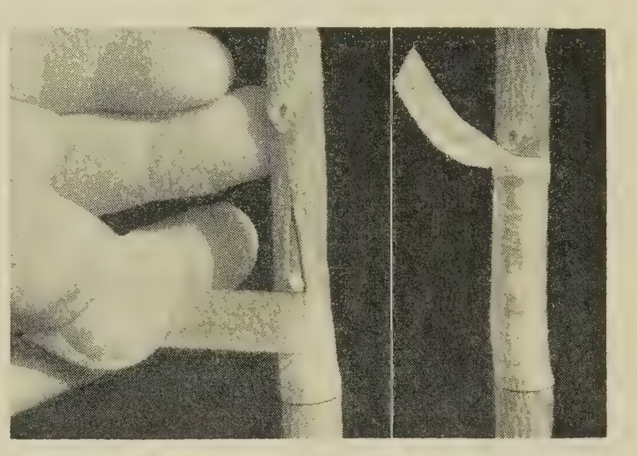
Australian experience has shown that P.V.C. plastic film is especially suitable and superior to raffia as a bud-wrapping material. It is waterproof and protects buds from excess moisture in wet weather and prevents drying out of the buds in hot, dry weather. As it is somewhat elastic, there is also no urgency to remove the ties to avoid constriction with quick-growing stocks. The strips should be about ⅜ in. wide and long enough for convenient wrapping. Polythene plastic strips are not very suitable for wrapping buds. The material is inelastic and tends to break when normal tension is applied to tie it.

If the erect T method of budding is preferred, the operations described above are reversed.

Labelling the Nursery

It is very important to indicate the positions in the nursery of each variety by durable markers clearly showing scion and stock varieties. A plan of the whole nursery duplicating these markers and showing the numbers of each kind budded is a valuable check if there is accidental destruction or removal of the field markers. In recent years there have been complaints and ample evidence of growers receiving trees that are not true to label. Often the grower does not become aware of the mistake till the first fruits appear several years after the trees have been planted. The trees can then be replaced, but in the meantime the grower loses through the expense of raising the unwanted trees and through delayed production from the replacements. The nurseryman is also likely to suffer because of the lack of confidence of other growers who learn of his mistake.


Inserting the bud (left) and the bud fitting snugly in the stock ready for tying.


Left—Wrapping the bud. Tying is started from the bottom in an inverted T budding, but from the top in an erect T budding. Right — Wrapping completed. Tying should be firm to exclude air and moisture. With P.V.C. plastic film, buds can be covered completely.

Tending the Budded Trees

About 3 weeks after budding raffia wraps should be removed to avoid excessive constriction of the stock and bud. With autumn budding or where P.V.C. plastic or rubber strips are used the wraps can be retained longer. Care must be taken not to untie buds too soon, for if the flaps of bark holding the buds in place have not strongly reunited with the stocks, they may curl out and allow what could have been successful buds to dry out and die. If necessary buds should be re-tied after the first inspection to ensure that budding is successful.

Buds which have "taken" will still be green. Mouldy, brownish, or dried-out buds have obviously failed to unite. If the stock is still suitable, another bud should be inserted immediately to maintain the nursery trees as uniform in growth as possible.

A successful bud forced into growth by removal of the stock top. It is wise to leave a stub of several inches above the bud so that any die-back of the stock will not endanger the bud.

Autumn buds generally lie dormant in the stock through winter. Just before spring growth starts the top of

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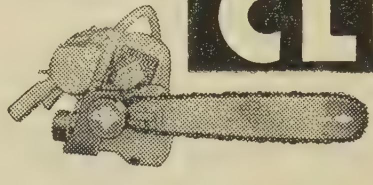

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the stock is removed to force growth into the bud. With spring or summer buds the stock can be cut back as soon as the wraps are removed and it is obvious that the bud has taken. The top can be removed with secateurs about ¼ in. above the bud with a sloping cut back from the bud to hasten healing of the wound. Under some conditions, however, there is a danger with this practice that the stock may die back from the cut beyond the inserted bud, which is then lost. It is therefore generally wiser to leave a stub of 2 or 3 in. above the bud when removing the top. This stub can be removed without danger once growth from the bud is well established. Healing of the pruning wound may be hastened by covering it with a heavy grade of petroleum jelly.

To promote good growth careful attention to manuring and weed, pest, and disease control must continue. Sometimes a leaf chlorosis due to manganese deficiency may appear in young nursery trees. This can be corrected by spraying the trees with manganese sulphate in spring before they are lifted. The spray is made up in the same way as bordeaux mixture at the rate of 6 lb. of manganese sulphate and 8 lb. of hydrated lime to 100 gallons of water.

Training the Bud Shoots

After the top of the stock has been pruned off only one shoot should be permitted to grow from the scion bud, and all shoots arising from the stock portion must be removed as they appear. The bud shoot should be encouraged to grow straight and erect for about 15 to 18 in. before the branches begin. Too many nursery trees have branches right at the bud union. It is good practice to guide the growth of the bud shoot by tying it at intervals to a stake driven firmly into the ground alongside the plant. Much more use should be made of this method in New Zealand nurseries.

Sometimes the young shoot which first grows from a bud will wilt and die for no apparent reason. After a time a new shoot generally appears and grows away satisfactorily, but the loss of the original shoot usually means that the tree must be left to grow in the nursery a year longer than would otherwise be necessary.

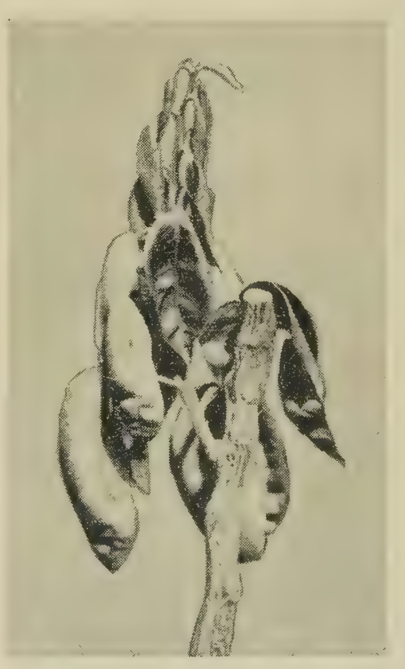
This bud shoot wilt has been observed in many citrus nurseries in New Zealand on rough lemon (citronelle), sweet orange, and trifoliata rootstocks and with orange, mandarin, grapefruit, and lemon scions. It is generally not a serious problem, but one nurseryman has had more than 20 per cent of the trees in a block affected. The cause of the trouble is not known, but studies of a similar problem in America suggest that it may be due to incomplete union of inserted buds, which prevents enough water from entering the shoots during hot or dry periods. Later, once the union becomes completed, another shoot can grow away again satisfactorily.

Bamboo stakes used to support bud shoots on young Silverhill mandarin trees to ensure erect, straight-stemmed trees. Staking and tying bud shoots should be done much more widely in New Zealand citrus nurseries.

Lifting and Handling Nursery Trees

Strongly growing trees which were propagated on well grown stocks are often large enough for planting 1 year after budding, but usually the buds are allowed to grow for 2 years before the trees are lifted from the nursery. The best trees for orchard planting are those that reach planting size quickly. Well grown 1-year-old trees are to be preferred, but whether 1-year-old or 2-year-old trees are chosen, they should be uniform in size and appearance, straight stemmed, healthy, and large in relation to their age. Slow-growing trees that do not progress as well as the majority in the same nursery block are probably inherently weak and are never likely to make good trees. They should therefore be discarded and not left in the nursery until they reach a plantable size.

Citrus trees are lifted from nursery rows from May to September as they are required. To check growth and



Bud-shoot wilt, a physiological disorder of young citrus bud shoots. After a time a new shoot usually appears and grows satisfactorily.

harden up the trees before digging they are usually wrenched in the previous April. Wrenching can be done by thrusting a sharp spade into the soil at an angle on either side of the nursery row 6 to 9 in. from each tree trunk and cutting the main roots of the tree as deeply as possible. In a few nurseries wrenching is done mechanically by pulling a device with a U-shaped blade through the soil beneath the nursery row.

Trees for commercial planting are sometimes lifted with bare roots, but trees for the home garden trade are invariably dug with a ball of soil adhering to the roots. Before trees with bare roots are lifted the transpiring surface of leaves must be reduced by cutting the tops back fairly hard. As soon as the trees are lifted precautions must also be taken to prevent the roots from drying out by wrapping them in damp sacks or by some other suitable means. Later the trees can be examined in a packing shed and prepared for immediate planting or dispatch. The roots should be trimmed and any injured parts removed. Trees for dispatch should be packed in a suitable wooden box or crate with their roots in damp sphagnum moss or sawdust and their tops covered with hessian.

Trees to be "balled" must be lifted with care to avoid the breaking away of soil attached to their roots. The ball of soil containing the roots is trimmed neatly and a piece of sacking tied firmly round the ball with twine or flax. The tops of balled trees are normally not cut back when they are lifted, but with trees with large heads this would be an advantage.

Raising Trees from Cuttings

Propagation of citrus trees from cuttings is not generally recommended, but many Meyer lemon trees are raised in this way and grow well on their own roots. Cuttings are usually taken in April or May.

They are made from well matured terminal twigs which are cut into pieces about 6 in. long. The leaves are trimmed from the lower end of each cutting, but two or three leaves should be left at the top. Before planting, a sharp knife should be used to remove the bottom end of the cutting with a clean, square cut just below a node. This will induce maximum rooting.

The cuttings are then usually rooted in a sandy, well drained soil under glass, bottom heat being used. Soil temperatures between 75 and 90 degrees F. will give best results. The cuttings are initially planted close together and buried to about three-quarters or more of their length. A high atmospheric humidity must be maintained to prevent wilting, and air temperature should be fairly warm. Considerable root development occurs after 6 to 8 weeks, after which the cuttings are lifted and planted in another bed at wider spacing for further development and hardening off. This may be done in another glasshouse or under cloches in the open. After 2 more months the then well rooted and hardened cuttings are transferred in August or September to nursery rows where they are allowed to grow for one or two seasons before being lifted and balled in the usual way for sale.

Reworking Established Citrus Trees

Growers sometimes find it desirable to change the variety of trees in their orchards. If the trees are sound, vigorous, and not too old, it is possible to rework them to a desired variety, but if there is any doubt about their suitability for reworking, they should be removed and replaced with young trees.

The danger of producing incompatible combinations should also not be overlooked. Generally, reworking a tree to a different strain or type of the same variety, such as Valencia orange to Carter navel orange, or Meyer lemon to Villa Franca lemon, or Wheeny grapefruit to New Zealand grapefruit, etc., is likely to be satisfactory. Some other combinations of different kinds of citrus such as lemons on oranges, mandarins on oranges, and oranges on mandarins may also be satisfactory, but very little information on the compatibility of various combinations has yet been gathered in New Zealand.

Australian experience has shown that sweet orange worked on to Wheeny grapefruit results in very poor growth, so it would be wise to avoid this combination. Caution is also advisable with combinations such as mandarin on Wheeny grapefruit, and orange or mandarin on New Zealand grapefruit or lemon.

Several methods of reworking citrus trees have been tried in New Zealand, often with disappointing results, especially where severe cutting back and grafting of stubs were required. The technique discussed here requires only the budding procedure already described for the propagation of young trees and no cutting back until after the buds have taken.

It is better to rework trees by budding in autumn, as a longer season's growth can be obtained from autumn buds than from spring buds. Nevertheless trees can be reworked satisfactorily in spring.

Three to six well placed branches should be chosen for budding, but with younger trees it is often possible to bud on to the main trunk. It is generally necessary to do some pruning at the time of budding to give the operator room to work in. This pruning should not be excessive.

The branches selected for budding should be about 2 to 4 in. in diameter, but no larger. The buds used for reworking trees should be larger than are normally used in propagating young trees. Budwood about ⅜ in. in diameter is suitable.

Two or three buds should be placed in each of the selected branches to increase the chances of a successful take and should be inserted if possible on an erect portion of branch or on the upper surface of a branch that is not fully upright.

The bark on old branches is sometimes too thick and not pliable enough for satisfactory budding. The bark of such a branch should be thinned to a suitable thickness at the point of budding by carefully shaving it with a sharp knife.

If the budding is successful, autumn buds are allowed to remain dormant until early spring, when the budded branches are cut off several inches above the buds to force their growth. With spring buds the branches are cut off immediately it is obvious that the buds have taken. Unbudded branches on the tree should be allowed to remain as "nurse" limbs to sustain the tree and keep the roots in good condition while the buds are growing.

Growth from the buds is normally very vigorous and care is necessary to see that the shoots are not knocked or blown off the tree. The growth can be controlled and hardened by pinching the shoot back after it reaches a length of 12 in. or so. If more than one bud grows on any one limb, that which is most suitably placed should be retained and the others removed. Once the growth from the buds is well established the branch stubs must be cut back to the bud with a sloping cut and the wound neatly trimmed with a sharp knife and covered with heavy grade petroleum jelly to facilitate healing.

As the growth from the new buds develops the nurse limbs should be gradually cut back and finally removed entirely about 2 years after the budding was done.

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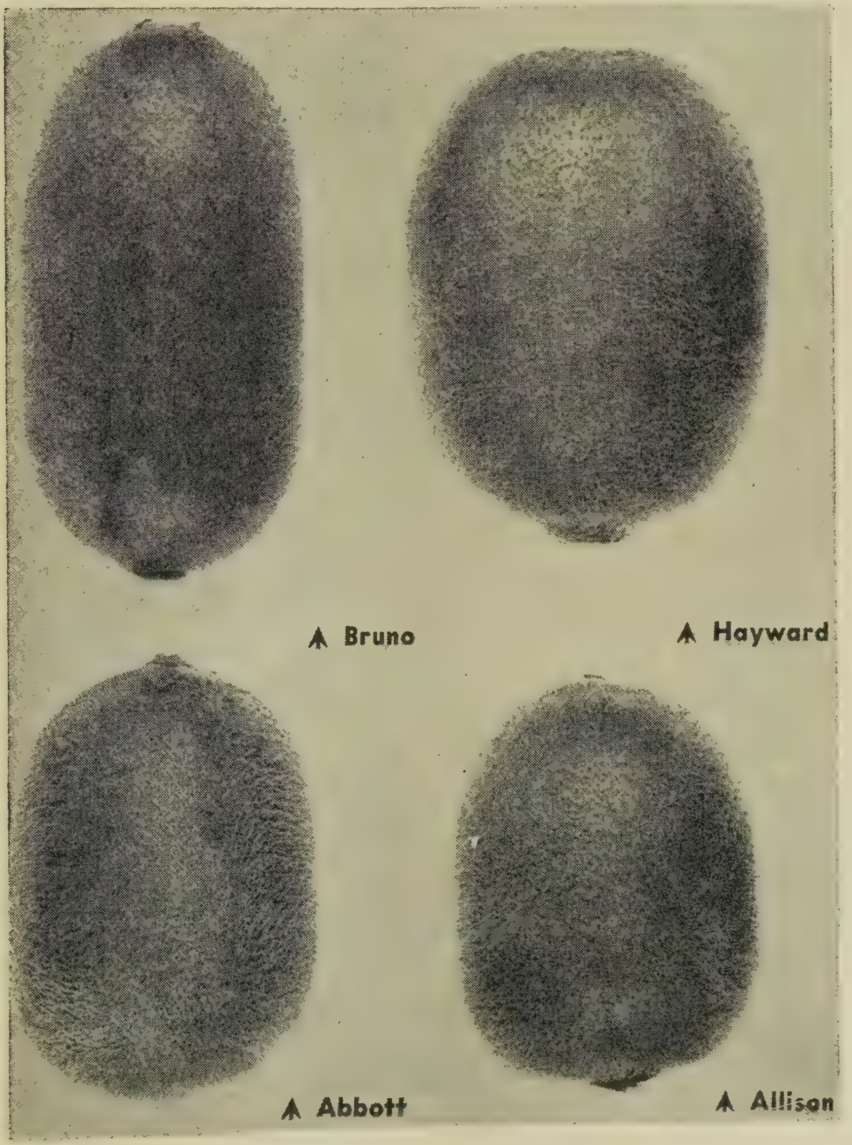
New Zealand Varieties of YANG-TAO or CHINESE GOOSEBERRY

By H. M. MOUAT,
Fruit Research Division, Department of Scientific and Industrial Research, Auckland

PRODUCTION of the yang-tao or Chinese gooseberry *(Actinidia chinensis)* in New Zealand amounted to about 300 tons in 1957 and when the existing young plantings come into full bearing in the next 4 or 5 years is likely to be about double that quantity. Further plantings are still being made. At present New Zealand is the only country producing this fruit on a commercial scale, but since the first shipments were made to London in 1952 other countries have become interested, and seed and plants have been sent from New Zealand to parts of Australia and the United States of America as well as to Denmark, Germany, Hawaii, Holland, and South Africa.



THE plant is a very vigorously growing woody vine. It is a native of China, where it is commonly found climbing up into tall trees, especially along the Yangtse Valley in the north-west Hupeh and Szechuan provinces at elevations of from 1,800 ft. to nearly 7,000 ft.

It was first described in 1847 from specimens sent to England by Robert Fortune, collector for the Royal Horticultural Society, but it was not grown outside Asia until seeds were sent to England by E. H. Wilson in 1900. In 1904 plants were sent from China to the United States and these were successfully established.

The species was given an Award of Merit by the Royal Horticultural Society in 1907, flowered for the first time in England and France in 1909, and fruited in England in 1911. The plants introduced into the United States flowered, but were all males.

Introduction to New Zealand

The Chinese gooseberry fruited for the first time in New Zealand, as far

Common Name an Unfortunate Choice

THE common name given to *Actinidia chinensis* in New Zealand deserves comment. When the fruit was first introduced to foreign residents of Ichang, China, by the plant collector E. H. Wilson it found immediate favour and, as a result of the habit Europeans have of giving familiar names to unfamiliar fruits, it became known throughout the Yangtse Valley as the Ichang gooseberry.

In New Zealand it is known as the Chinese gooseberry. This is unfortunate as the fruit has practically nothing in common with the true gooseberry and it is probable that this name has prejudiced the status of the new fruit when introduced to overseas markets.

The common gooseberry does not command a high position on any market and, by association of names, prospective buyers are likely to place the Chinese gooseberry in the same category. It would seem preferable to retain the Chinese name yang-tao as has been done for another Chinese fruit, the litchi, or to use actinidia for the popular name as well as the botanical one. Botanical names seem to be accepted as common names quite readily, and actinidia is much pleasanter sounding and more easily pronounced than many other plant names in common use such as feijoa and eschscholtzia.

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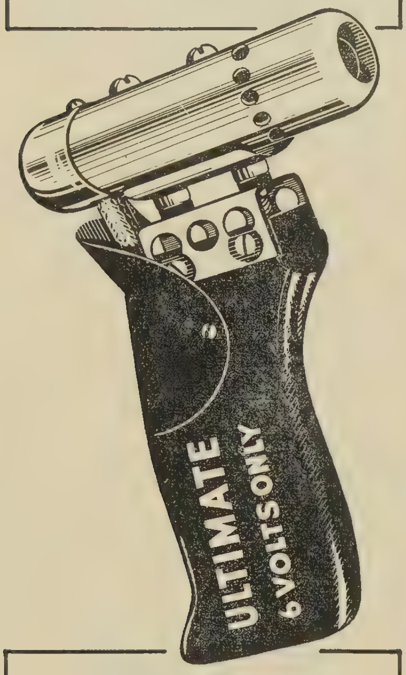

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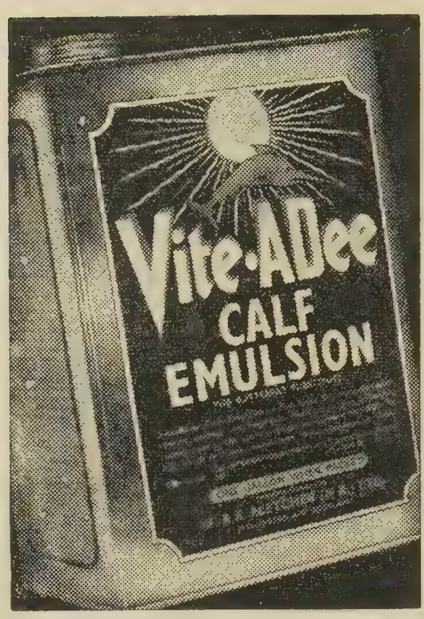

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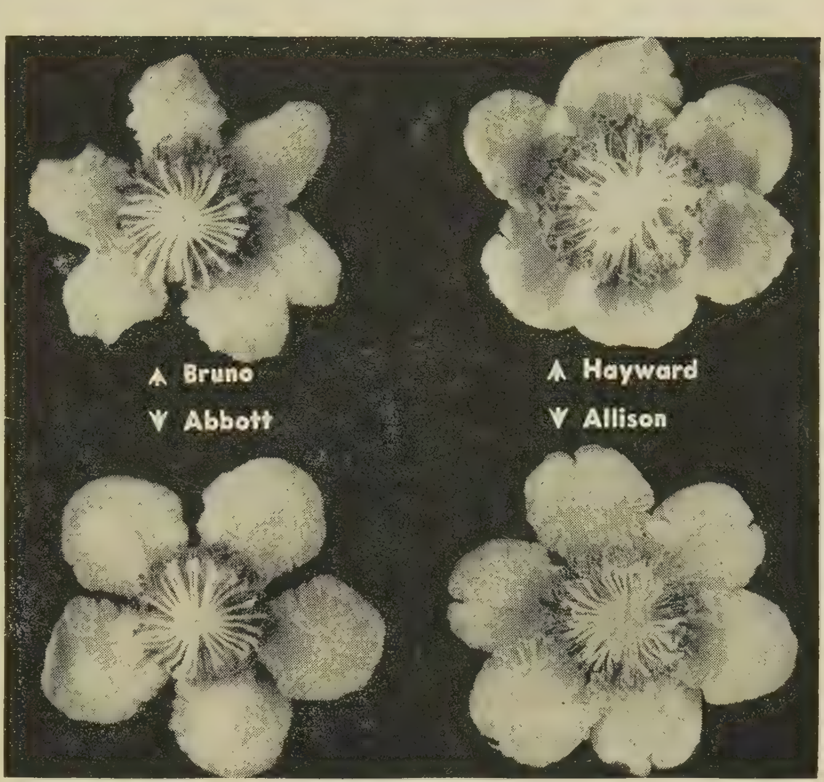

as we know, in 1910 on the property of the late Alexander Allison, of Wanganui. It is believed that he was given the seed by James McGregor, who obtained it while on a visit to China.

After Mr Allison's vine fruited several keen horticulturists became interested in growing the fruit. Among these were W. E. Wightman, of Awahuri, Fred Walker, of Wanganui, N. Gorton and Frank Mason, of Feilding, and B. H. Just, of Palmerston North.

For many years there was little general interest in the fruit, perhaps because of the large amount of space demanded by the vines and the fact that after growers had waited several years for the seedlings to flower many of them proved to be non-bearing males.

Work of B. H. Just

It was mainly due to the late Bruno H. Just that the Chinese gooseberry became more widely grown. He raised large numbers of seedlings, many of which he planted out on his own nursery and when these fruited he selected several types which he propagated and sold as grafted plants. These selections were much superior in size and uniformity of fruit to the general run of seedlings.

Unfortunately Mr Just did not name any of his selections. They were sold by him and other nurserymen under labels such as large fruited, giant, large long, etc. Most varieties grown commercially today were raised by B. H. Just. The well known nurseryman Hayward R. Wright, now living in retirement in Tauranga, raised one or two other important varieties.

Some of the early commercial plantings were of inferior seedling selections. Some plantings gave comparatively small fruit and others a proportion of large fruit together with a large number of smaller size. Fruit quality was poor in some sorts, especially those with tough fibres through the central axis. These vines have now been worked over to plants of a desirable type.

Varietal Trials

A variety trial of the best types has been planted on a clonal rootstock at the Oratia Research Orchard of the Fruit Research Division and a smaller trial of the same varieties has been set out on the Horticulture Division's trial area at Kerikeri. Varieties in the trial include those most commonly grown in commercial plantings together with a number of other selections.

When a survey was being made to select types for this trial it was found that in many instances the original source of planting material was unknown. Varieties were often known by the name of the person from whom graftwood had been obtained or by the name of a district where a particular type of fruit was most widely grown.

This confusion was cleared up by extensive comparisons of varieties in the field, and by interviews and correspondence with informed persons. To distinguish the selected varieties names were given which are now being used by many nurserymen and growers.

DESCRIPTION OF VARIETIES

A brief description of varieties was issued to officers of the Horticulture Division, Department of Agriculture, in 1956, and it is not proposed to publish full pomological descriptions until vines in the variety trial are in production. These plants growing under uniform conditions permit a direct comparison between varieties, unaffected by differences that sometimes arise from environment.

Since it is desirable that growers should be able to check the identity of a variety, the following notes have been prepared to serve until full descriptions are available. The features described are reasonably constant under a wide range of environments.

Descriptions of foliage are not given in these notes, though some varieties can be distinguished by leaf characters, particularly nursery plants. Differences in flowers and fruit are more marked.

It is surprising that until the present study was made it had not been reported that yang-tao varieties could be distinguished by their flowers. Time of bloom is variable, flowers of the earliest variety being at petal-fall stage, when some others are just opening their buds. Number, shape, and arrangement of petals and arrangement of styles are also quite variable. In the four varieties under consideration the flowers of some such as Hayward are so distinctive that an inexperienced person can easily identify them from the description.

All varieties so far studied can be distinguished by their flowers, but as more varieties are selected it is probable that some will have flowers intermediate in type to those of existing kinds, and identification will become more difficult.

The illustrations show fairly typical flowers of four varieties. In Hayward note the cupped petals and upright arrangement of styles compared with the flattened position of styles in the other three varieties.

It is best to examine flowers shortly after they open and petals are fully expanded. As the flower ages the position of styles may alter in some varieties, and petals ultimately change from white to buff and may become reflexed to various angles from the horizontal. Individual blooms vary somewhat, so when identifications are made it is advisable to work with a sample of 15 to 20 flowers.

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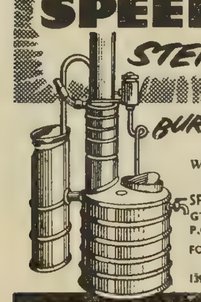

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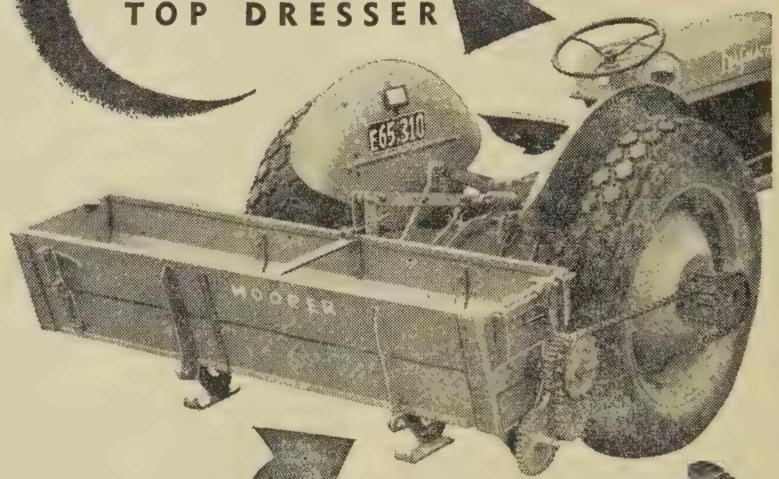
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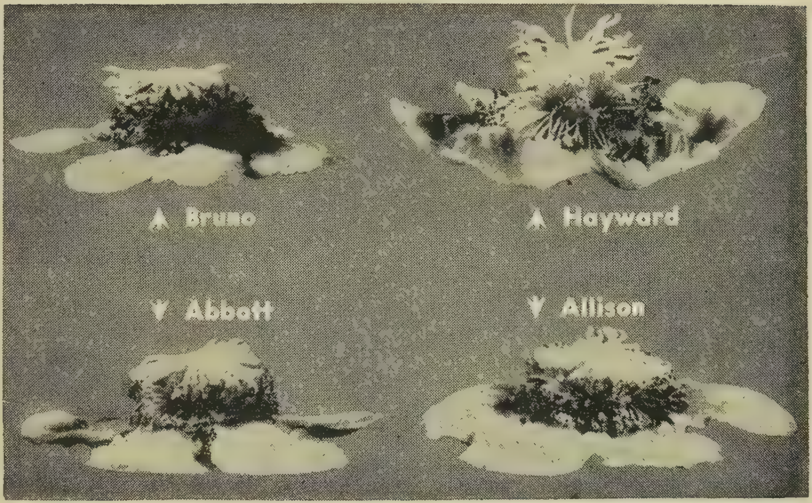

With fruit, differences are evident in size, shape, colour, density of hairs, and various internal characters such as colour of the flesh and shape of the core in cross section. The fruit of Hayward is unusually large. Commercially, there is little difference in size of fruit between the other three varieties.

When fruits of varieties resembling each other are compared it is advisable to take a sample of 12 to 20 fruits of average size for each variety. Small fruits are often difficult to identify.

The following four varieties are commonly found in commercial plantings and home gardens. Synonyms having only restricted usage have not been given.

Abbott (Syn. Green's)

Much of the planting stock of Abbott was raised by Green's Nurseries, Campbell Road, Auckland, who obtained scions from Mr Abbott, Queen Street, Onehunga. Mr Abbott obtained his plants in the first place from Hayward Wright's nursery. The variety may have been propagated from a seedling raised by Mr Wright or from a plant obtained by him from B. H. Just. Exports of fruit to Britain have consisted largely of this variety.

Flower

Abbott is one of the earliest flowering varieties. The petals are fairly widely separated and do not overlap. The styles are regularly arranged in a horizontal plane like the spokes of a wheel. As the flower ages, the styles may elevate to an angle about 20 degrees from the horizontal and return to their original position as the flower withers.

Fruit

The oblong fruit is covered with dense hairs, longer and softer than those of Bruno. There are about 7½ fruits to the pound.

Allison (Syn. Large Fruited)

Allison was named after the late Alexander Allison, a keen plantsman and the first to grow *Actinidia chinensis* in New Zealand. Allison was raised by Bruno H. Just and was probably the most widely distributed of all his selections. It was propagated by a number of other nurserymen, many of whom discarded it later with the introduction of the larger fruited Hayward. It is still a very good commercial variety.

Flower

Allison comes into flower later than Abbott. It can be distinguished from the latter by the broader, overlapping petals which tend to be crimped along the overlapping margins. Arrangement of styles most resembles that of Bruno, but they tend to be more twisted and less regularly arranged than those of that variety. As the flower ages the styles may elevate to an angle of 60 degrees and seldom less than about 30 degrees from the horizontal.

Fruit

The fruit most resembles that of Abbott, but is somewhat broader in proportion to its length, and it tapers slightly to the stem end. There are about 8¾ fruits per lb.

Bruno (Syn. Long Fruited, Te Puke)

Bruno was named after Bruno H. Just, its originator. The first extensive planting was at Te Puke, but it has been propagated by a number of nurseries and is now fairly widely grown. Export shipments have been partly made up of Bruno.

Flower

Flowers open at about the same time as, or slightly later than, those of Allison, which they most closely resemble. The petals of Bruno are narrower and less overlapping. The styles are longer and stouter than those of Abbott, and are more regularly arranged than those of Allison. When the flower ages the styles elevate to an angle intermediate between those of Abbott and Allison.

Fruit

The elongated fruit of Bruno cannot be confused with that of any other variety grown at present. It is usually a darker brown than the other sorts and is covered with very dense, short, rather bristly hairs. There are about 8 fruits per pound.

Hayward (Syn. Giant, McWhannels, Hooper's Giant)

Hayward was named after its originator, Hayward R. Wright. It is outstanding for the large size of its fruit and it is grown in all districts. It produces lighter crops than the other varieties. This is partly due to the lack of pollination of this late flowering variety. Male varieties flowering at the same time have to be grown with it. Though some growers have discarded the variety, others consider that the higher prices paid on the local markets for the extra large fruit compensate for the lighter crop. Large sizes are not favoured by the overseas market.

Flowers and fruits of this variety are so characteristic that they cannot be confused with those of any other variety we have seen.

Flower

This is the latest variety of the group to bloom. Abbott may be almost at the petal-fall stage when Hayward is just opening its first flowers. The petals are broad, overlapping, and cupped. The stout styles are irregularly arranged from the horizontal to the vertical almost in a hemisphere.

Fruit

This variety can be identified easily by its very large broadly oval fruits, which are often slightly flattened laterally. They are a pale greenish-brown and are covered densely with fairly fine silky hairs. There are about 5½ fruits per pound.

I would be grateful to have my attention drawn to any inaccuracies or omissions in this account of the development of yang-tao or Chinese gooseberry varieties in New Zealand. I would also be interested to hear of any outstanding types other than those described. Though an attempt was made to examine as many different varieties as possible, it is quite likely that some particularly good types have escaped notice.

Acknowledgment

Thanks are due to growers, nurserymen, and others for information on the varieties, in particular to the late Frank Mason who recorded in his diary the first fruiting of the Chinese gooseberry in 1910, and to F. R. Just, who supplied important information on varieties raised by his father, the late Bruno H. Just.

Photographs by Department of Scientific and Industrial Research.

Care of Livestock during September

[*Neuline*

Contributed by the Animal Research Division

CARE OF EWES WITH TWIN LAMBS

FOR the first month or 6 weeks of life the lamb depends almost entirely on its mother's milk. Ewes are capable of producing more milk than a single lamb can drink in the early part of lactation, but twins can soon drink all the milk which the ewe can produce. For this reason ewes with twin lambs should be drafted off and grazed together on good paddocks. Separation is most easily done immediately after lambing.

ROTATIONAL GRAZING OF CALVES

Over 10 years at Ruakura well reared heifers have outproduced their poorly reared mates by an average of 21 lb. of fat in the first lactation when both were well fed after calving. Frequent changes to good clean pasture are essential if calves are to be successfully reared. This rotational grazing avoids deaths in winter, eliminates the need for drenching against worms, and produces yearlings 100 lb. heavier than those kept in the one paddock for weeks at a time. Further information on the good rearing of dairy stock is contained in Bulletin No. 228, copies of which are available from offices of the Department of Agriculture.

FEEDING THE MILKING HERD

Autumn-saved pasture is almost equal to high-quality spring pasture as a milk-producing fodder. Therefore ration it to the milking cows to make it last until the spring feed comes away and hardens up. An electric fence is essential for efficient utilisation, enabling it to be grazed in small breaks. Unless sufficient reserves of this pasture are available for full feeding, make up the balance with silage. Make sure enough hay is retained to balance the lush spring growth.

When the autumn-saved pasture is finished rotate the herd round the farm. Keep paddocks small enough to maintain a concentration of 20 to 30 cows per acre and if necessary, subdivide larger paddocks with the electric fence. Aim at grazing pasture when it is 4 to 6 in. high, as it is then at its most nutritious stage. Do not keep cows for more than 1 to 2 days in the paddock. If necessary, clean up after them with dry stock.

CARE OF PIGS

Late-farrowed spring litters should receive special attention, since they will be approaching weaning age. Creep feeding is the secret of the heavy weaner and best results will be obtained by having a supply of meal and milk always before the litter. Weaned pigs must be well fed and, if meal has been used before weaning, its use should be continued for at least a fortnight to avoid an after-weaning check. The meal ration will be reduced as the skim milk supply increases. It is preferable to feed meal to weaners up to half their daily rations and give the milk saved to the store pigs rather than feed meal to the older pigs at this stage.

After weaning, sows should receive sufficient milk and meal to enable them to regain the weight lost during previous suckling. They should be hand mated and once safely in pig may be allowed to subsist on good pasture.

VACCINATION AGAINST SCABBY MOUTH

On farms where scabby mouth occurs each new crop of lambs should be vaccinated; this is most conveniently done at marking. If lambs are not protected, they are likely to suffer a severe check, as the disease makes eating very painful. The vaccine gives very good protection if properly used. Care is necessary to keep the needle prong clear of grease; if it becomes blocked, no vaccine is applied and lambs may still be susceptible to the disease. Ewes which have not previously been exposed to the disease should be vaccinated at the same time as their lambs.

MASTITIS

Mastitis is usually most prevalent in spring. Carefully examine milk from all quarters each day in a strip cup. If there is any abnormality, treat the quarter without delay, using 3 tubes of penicillin cerate at 24-hour intervals. Prompt treatment at this time of the year will greatly reduce loss in production from light or dry quarters.

COCCIDIOSIS IN POULTRY

To prevent coccidiosis in chickens they must be kept growing steadily. Any check is dangerous. Cleanliness is very important, as the disease spreads through the soiling of food by droppings. If an outbreak occurs, sulphamezathine or sulphaquinoxaline should be used in the drinking water. Full particulars of dosage may be obtained from the Department of Agriculture's Poultry Instructors.

X CHICK DISEASE

The work carried out on this condition of chicks has shown it to be a form of vitamin E deficiency possibly arising from feeding certain batches of wheat.

Outbreaks of X chick disease (exudative diathesis) have apparently been confined to the South Island, and poultry farmers in the areas affected in previous years are advised to add 5 per cent of wheat germ meal to the chick mash as a precautionary measure.

Pasture and Crop Production

Seasonal Notes by the Extension Division

THE production of seeds of brassicas is now an important part of farming activities in some South Island districts. One of the hazards in the growing of these is the reduction in yields caused by aphid attacks. Chemicals for control of aphids are now available, but because of the harm the chemicals may cause to bees care in their use is necessary.

INSECTICIDES ON BRASSICA SEED CROPS

APHIDS, if present in sufficient numbers, can cause heavy losses in brassica seed crops. Severely infected crops result in low yields of small and shrivelled seed. For purposes of control, the aphid attack may be divided into two periods.

Where conditions are suitable for their rapid multiplication, aphids carried over in the crop from the previous autumn may cause deterioration of the crop before flowering. During this period it is safe to use the insecticides described below, which are toxic to bees, for the control of aphid infestation in these crops.

Frequently, however, the worst attacks occur from flowering until harvest time. During this period aphids may be on the wing, and crops can readily be infected from outside sources. Though crop deterioration at this stage can be considerable, it is dangerous to use materials which are toxic to bees, and their use is prohibited from September to March inclusive when flowering plants are in the crop.

METHOD OF APPLICATION

Aircraft offer the only practical means of treating brassica seed crops, and with most materials the effectiveness of this method depends largely on the ability of the aircraft to obtain adequate crop coverage. This is frequently the main limiting factor in treatment for aphid infestation.

Lindane can give reasonable control for about 14 days after treatment. This material is toxic to bees, but of even greater importance is the fact that contaminated bees may be capable of returning to the hive and so spread contamination and kill the brood also.

Methyl demeton ("Metasystox"), a systemic insecticide, is now being used on crops with good results, its effect lasting for about 7 days. As this material is translocated through the plant, complete coverage of the plant is not vital to the success of the treatment.

When either lindane or methyl demeton is used it is essential that adequate protection is given to the operator and that spray drift does not contaminate neighbouring flowering crops or bee hives. It is repeated that from September to March inclusive the spraying of crops in which there are flowering plants is prohibited.

—*W. V. HADFIELD*

* * *

FERTILISERS FOR POTATOES

EXPERIMENTAL work with potatoes over a wide range of soils and climates has shown that fertilisers supplying phosphate and nitrogen will give appreciable increases in yields. For this reason 3 to 4 cwt. of a 3 to 1 mixture of superphosphate and sulphate of ammonia is now usually applied to most main crop potatoes. The only exceptions to this general recommendation are, firstly, on soils of high fertility, where superphosphate should be used alone or with a lower proportion of sulphate of ammonia, because excessive nitrogen will tend to increase top growth and to delay maturity; and secondly, on early crops or in high rainfall areas, where higher rates of fertiliser will prove more profitable. Under such conditions the use of equal parts of superphosphate and blood and bone at up to 10 cwt. per acre is recommended. In all cases best results will be obtained if the fertiliser is sown close to the seed in the rows.

—*J. L. SYMONS*

* * *

POTATOES FOR THE SOUTH ISLAND

THE breeding, selection, and introduction of new potato varieties have now made available suitable varieties for most soil types. Of the main crop varieties, Aucklander Short Top is still the most popular. Though it is only a moderate yielder, it produces potatoes of excellent quality and is suitable for the medium to light soils. Arran Chief is a fairly heavy yielder, producing well shaped potatoes. It is more suited to heavy soils, especially in the south, where the climate is cooler. King Edward is a popular variety with growers in the southern part of the South Island, but in districts subject to dry periods it is rather disappointing. Dakota, grown mainly in parts of mid Canterbury and North Canterbury, does best on sharp silt loams and is a good cropper and a splendid keeper. Inverness Favourite is a main crop potato of good quality and is best suited for heavy, well drained soils. Sebago is growing in popularity and is being grown on all types of soil. On the heavier soils it produces a larger proportion of table potatoes. Arran Banner is popular for commercial use as an early variety.

Jersey Bennes, classed as a first early, is grown mainly in the southern part of the South Island. It resembles King Edward in that it does best in a cool climate. Chippewa and Katahdin, which produce good table potatoes, are early main crop varieties which prefer sheltered conditions. They are becoming more popular. Glen Ilam and Ilam Hardy are being grown on all soil types. When grown on heavy soils they give a heavy yield of good tubers. Epicure and Cliff's Kidney are grown commercially mainly to supply the home gardener with early seed potatoes. Epicure can be grown on most soil types and Cliff's Kidney should be grown only on the heavy soil types.

—*W. A. R. MILLER*

* * *

BUTTERCUP CONTROL IN AUCKLAND PROVINCE

WHERE buttercups are dense enough to compete seriously with pastures they should be sprayed with hormone weedkillers this month while the clover is still dormant. If spring is late, spraying may be continued into September until the clover starts to make active growth. Later spraying will result in clover damage with consequent reduction in pasture production. There is no reason why spraying should not be done in June or July, and in areas where the land remains firm until late winter but softens up in spring these very early sprayings are recommended.

Provided the clover has not started to come away, either 2,4-D or MCPA can be applied at ½ lb. acid equivalent per acre. Where late spraying is unavoidable and clover growth is vigorous MCPA should be used rather than 2,4-D. If very late spraying is necessary, MCPB or 2,4-DB should be used. These, however, are more costly and their use would normally be warranted only for spraying establishing pastures or to avoid clover damage.

—*G. L. BANFIELD*

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Recent Research Work

NITROGEN TOPDRESSING TRIALS AT INVERMAY

THE trials described in this article are part of a series to be conducted at the Department of Agriculture Invermay Research Station to provide information on the response and economics of nitrogen topdressing for pastures in Otago and Southland. Results for 1956 show it payable to apply up to 3 cwt. per acre of a nitrogen fertiliser in mid autumn; 1957 results show nitrogen application payable only up to 2 cwt. per acre.

DESCRIPTION OF TRIAL

TO obtain maximum responses a winter-growing grass is necessary. For this reason short-rotation ryegrass-dominant pastures were used for each trial. In the 1956 trial nitrogen * was applied at intervals of 6 weeks from early April onward at 1 cwt., 2 cwt., and 3 cwt. per acre. In the 1957 trial nitrogen was applied at the same rates in early April only.

[*Here and in subsequent references nitrogen means a mixture of ammonium nitrate and lime containing approximately 20 per cent. of nitrogen.]

YIELD RESULTS

In the 1956 trial good responses were obtained from all nitrogen applications. The increases in dry matter production from early April to the end of the feeding-out period (early September) were: 1 cwt., 22 per cent; 2 cwt., 37 per cent; 3 cwt., 46 per cent. Responses from mid May were: 1 cwt., 17 per cent; 2 cwt., 18 per cent; 3 cwt., 39 per cent. The early April application outyielded the mid-May application only because of the extra 6 weeks' production from early April to mid May. For the spring period from early September to mid October the early April application continued to give from 2 per cent to 10 per cent response.

In the 1957 trial weather conditions were not as conducive to winter growth and responses were not as marked as in the previous season. Increases in dry matter up to the end of the feeding-out period were: 1 cwt., 14 per cent; 2 cwt., 29 per cent; 3 cwt., 26 per cent. For the spring period from early September to mid October the early April applications gave responses similar to those of the previous season.

SWARD COMPOSITION

To begin, both trials showed similar sward composition, with clovers composing 4 per cent of the sward. After nitrogen application the amount of clover remained stable at the 3 to 4 per cent level until September, when a rapid increase in clover percentage occurred, and by mid December was:

TOTAL CLOVER PERCENTAGE

	December 1956	December 1957	February 1957
Untreated	65	35	48
1 cwt. of nitrogen	54	24	52
2 cwt. of nitrogen	47	25	58
3 cwt. of nitrogen	40	37	49

It is frequently stated that the use of nitrogen will seriously deplete the amount of clover in a pasture. These trials demonstrate clearly that clovers can be retained in a pasture through suitable pasture management and phosphate topdressing.

RESULTS

Before results from these trials are considered in monetary terms a few words about the seasonal conditions are necessary. The 1956 summer and autumn were extremely dry and this resulted in below-average amounts of hay being conserved. The winter feed situation was further aggravated by the failure of many turnip and swede crops owing to mosaic disease. Offsetting this feed shortage were the ideal growth conditions in late autumn and winter, which allowed some feed to be conserved in situ. Under these conditions nitrogen responses were greater than would perhaps normally occur. This should be borne in mind when the costing data which follow are considered.

For the 1957 season the situation was reversed. Adequate hay was conserved and few turnip and swede crops were infected with mosaic disease, so that there was not the same need to apply nitrogen to overcome a winter feed shortage.

For the purpose of considering the economics of nitrogen topdressing a comparison has been made of the cost of buying in hay at ruling prices with the cost of applying nitrogen fertiliser. A charge of 10s. a bale is allowed for the 1956 season and 6s. a bale for the 1957 season. A cost of 3d. per bale is allowed for feeding out, no allowance being made for cartage to the farm. A charge of 3s. per acre is made for applying the nitrogen at all rates.

COMPARISON OF COSTS OF NITROGEN WITH COSTS OF BUYING HAY UP TO THE END OF THE WINTER FEEDING-OUT PERIOD

(per acre)	Production increase (lb. dry matter)	Cost per acre s. d.	Hay equivalent to production increase (bales)	Cost of hay s. d.
1956		Early April application		
1 cwt. of nitrogen ..	280	37 6	6.9	70 9
2 cwt. of nitrogen ..	580	72 0	14.3	146 6
3 cwt. of nitrogen ..	600	106 6	14.9	151 9
		Mid-May application		
1 cwt. of nitrogen ..	160	37 6	4.0	40 9
2 cwt. of nitrogen ..	170	72 0	4.2	43 0
3 cwt. of nitrogen ..	370	106 6	9.1	93 3
1957		Early April application		
1 cwt. of nitrogen ..	270	37 6	6.7	41 10
2 cwt. of nitrogen ..	540	72 0	13.3	83 2
3 cwt. of nitrogen ..	500	106 6	12.3	76 11

From these comparisons it is evident that it was economical to apply up to 3 cwt. per acre of nitrogen in early April 1956. In mid May 1956 it was payable at only 1 cwt. per acre. For the 1957 season it was only economic to apply nitrogen up to 2 cwt. per acre in early April.

These results show that the most efficient use of nitrogen will be obtained when a light rate is applied over a large area rather than the reverse. The extent to which this can be done will be limited by the amount of short-rotation ryegrass-dominant pasture available. It should be borne in mind that the dry matter produced by the nitrogen is in the form of fresh, green herbage.

CONCLUSIONS

When these results are considered it is important to bear in mind the certainty of winter feed resulting from buying hay, but the uncertainty of response from nitrogen application. Possibly a compromise could be made between these two methods.

One very important factor in favour of the use of nitrogen fertiliser is the value of the saved pasture in the prevention of sleepy sickness before lambing and before spring growth begins. The value of the fresh pasture in aiding stock health and reducing mortality cannot be assessed, but may far outweigh the costs of the fertiliser.

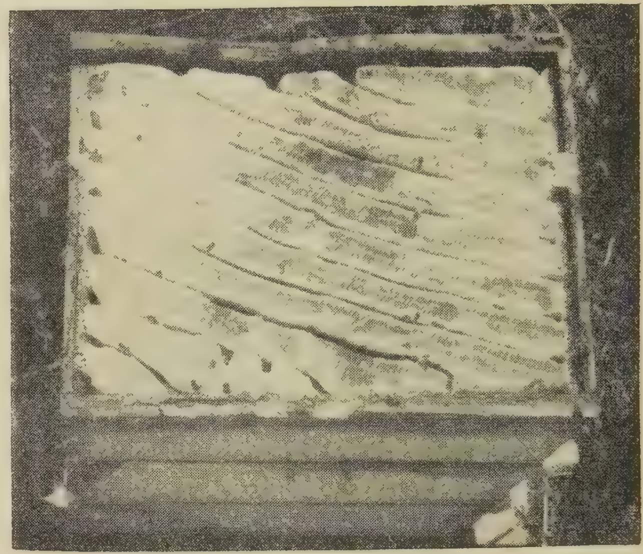
Results from these trials indicate that nitrogen fertilisers may have a place in the farming economy at Invermay, but several years' results are necessary to get a picture of average conditions before more definite recommendations can be made.

—*R. S. SCOTT*

Frameless Hives Cause Trouble and Loss

By L. J. S. LINE,
Apiary Instructor, Department of Agriculture,
Hastings

THE importance of having standard and movable bee frames in a hive is illustrated at right, showing how bees built comb in the frameless top super of a three-storey hive. The roof has been removed and it can be seen how the bees built their comb from the roof downward and cemented it to the sides as they used to do in the outmoded box hives of many years ago. Breakage of comb and considerable bleeding or weeping of honey are inevitable when such a hive has to be opened.



IT is an offence under the Apiaries Act to have hives without movable frames or to have frames so cemented together that they are immovable.

The need for movable frames was apparent many years ago when American foul-brood disease reached epidemic proportions among apiaries and it became necessary to inspect hives regularly with as little disturbance as possible to their interior arrangements. Broken or bleeding honeycomb quickly excites bees, particularly when there is no honey flow and they then attempt to rob other hives and start a sequence of trouble.

A box of honey without frames is also a nuisance for the beekeeper to handle. Unless a special tray or wooden pallet is provided, the honey drips on clothes or equipment all the way from the hive to the honey house, and then at the honey house the mass has to be completely broken down or melted to separate the honey from the wax. For the beekeeper who wants well formed, permanent combs this is bad wastage and is likely to lead to lack of enough well made frames to collect all the honey offering at the peak of a nectar flow.

The domestic beekeeper who has been caught with insufficient frames to provide for his bees, and as a result gets cross-built comb in frames too widely spaced in the supers, would probably find it easier to separate the honey from this malformed comb by making a strainer of perforated zinc or the wire gauze used for meat safes fixed on a wooden frame. Such a frame is more readily scraped or cleaned of wax and is more convenient than using cheesecloth or similar material.

It is desirable to have made up during the off-season enough honey frames to fill at least four supers or boxes for each hive. This should obviate having to cut honeycombs out of a box and would enable the beekeeper to make the necessary routine inspections of his hives for disease control and for the prevention of swarming.

☆

Retirement of Mr A. J. Kerse, Superintendent, Flock House

Mr A. J. Kerse, who retired from the position of Superintendent, Flock House Farm of Instruction, Bulls, on 30 June after 14½ years' service with the Department of Agriculture. His sound practical knowledge and his patience and ability as a teacher of farm practices have been most valuable to the Department and to trainees at Flock House. He joined the Department in November 1943 and after experience as a Fields Instructor at Auckland he became Superintendent at Flock House in January 1951.

Department of Agriculture's Annual Report

THE Annual Report of the Department of Agriculture for the year ended 31 March 1958, containing reports of the Director-General and Directors of the Animal Research, Animal Industry, Dairy, Extension, and Horticulture Divisions and various industry accounts, will be presented to the House of Representatives in the present session of Parliament.

A new feature in this year's report, "The Farming Year", reviews the primary production industry generally and comments on marketing and economic trends and prospects.

Copies may be ordered from the Publications Section, Department of Agriculture, Box 2298, Wellington, or from the Government Printer, Wellington. The price per copy will be approximately 6s. 6d.

Comprehensively indexed, the Annual Report should be of wide interest to all primary producers as a record of the research and extension services and activities of the Department.

◆

Identical Twin Calves Wanted for Research

To enable research projects in which identical twin calves are used to be continued at the Department of Agriculture's Animal Research Station at Ruakura the Station is appealing to farmers who have such calves to make them available.

Sixty-five sets of identical twins will be required this season.

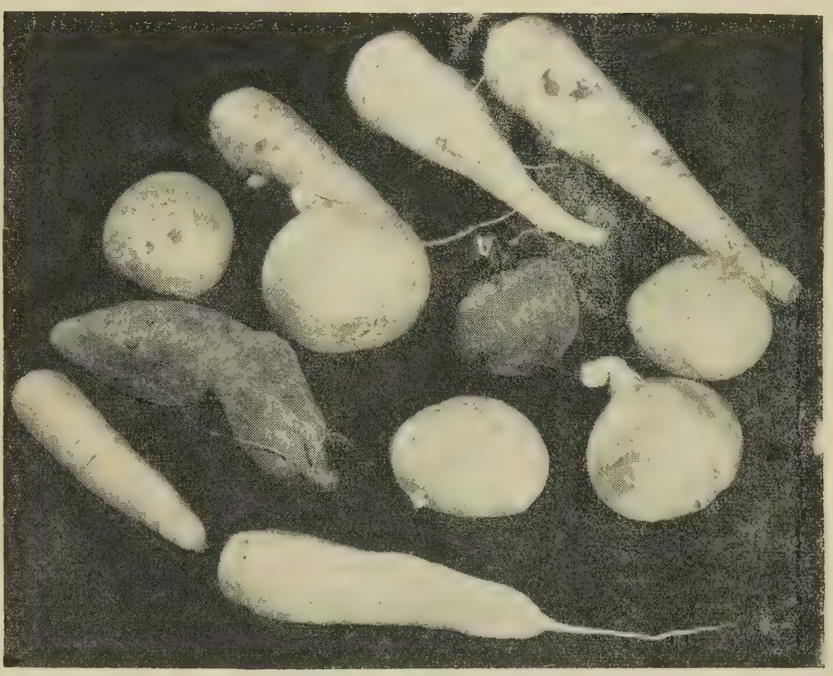
Farmers in the Waikato and South Auckland districts who are willing to sell such calves to Ruakura are asked to inform the Station by letter, telegram, or telephone (65-188 Hamilton).

The price paid per set is £7.

◆

Attractive and Appetising Ways of Serving Root Vegetables

ROOT vegetables are valuable. Much emphasis has been placed on the nutritional value of green vegetables, but root vegetables, too, provide mineral salts, vitamins, calories for heat and energy, and are a great help to the housewife because of their keeping qualities. Root vegetables can be prepared and served in such a variety of ways as to tempt the palate of the most inveterate vegetable hater, besides giving the housewife a wide choice of inexpensive yet nourishing and attractive dishes to set before the family.



PROPERLY prepared and cooked, root vegetables form a valuable accompaniment to meat dishes, this being perhaps the most popular way of serving them. However, vegetable dishes on their own can be prepared in such a way as to bring out their own true and delicate flavours to the best advantage. The choice and preparation of these vegetables is quite as important as the cooking and service of them.

Choosing Root Vegetables

If it is possible to go to the garden and pull the vegetables at the right stage of maturity and prepare them immediately for a meal, there is no better way of getting them. However, such a state of affairs is not possible for all. Therefore, we should know a little about choosing the vegetable from the shop.

Size is not the most important thing; it is better to choose young and fresh vegetables. These are sweeter, crisper, and have more flavour. It is not economical to buy old, wilted-looking vegetables even if they are sold more cheaply, as waste will be greater and flavour poorer. Points to look for are good colour, even shape according to type, freshness, and firmness.

Storage of Root Vegetables

Root vegetables can be kept quite satisfactorily in a cool place without refrigeration. A cool, dark, dry, and well ventilated place is best. A shelf of wire netting or wooden slats is ideal, as it allows good circulation of air round the vegetables. Onions keep well for winter use if strung from the walls or roof. All stored vegetables should be kept away from direct sunlight.

Preparation

To preserve the maximum amount of vitamins and mineral salts, root vegetables are best cooked in their skins. To prepare them for this, wash them well and scrub with a small hard-bristled brush to remove dirt in small cracks and crevices. Try not to break or cut the skin. This is especially important when dealing with beetroot.

If it is not possible to leave the skin on, scrape or peel as thinly as possible. Onions, parsnips, swedes, and turnips should have their outer skins removed. Beetroot should be well washed and any dirt adhering removed with a brush. Cut the leaves from the top of the plant, leaving about 1 in. of stem. The taproot should be left and skin not be broken or cut in any way. If it is broken, there will be loss of juice and colour as the beet is being cooked.

By ELEANOR S. CAMPBELL,
Home Science Instructor,
Department of Agriculture,
Auckland

Cooking

Baking: Baking in the skin is not suitable for all vegetables. Potatoes are particularly suited to this method, as they contain a large percentage of water, which turns to steam in the heat of the oven. As the skin keeps this steam enclosed, it breaks down and softens the starch cells inside. The potato should be pricked to allow the steam to escape before serving. Beetroot may be baked in the skin also. Onions, carrots, parsnips, and kumaras can be peeled thinly and baked in a casserole dish with a close-fitting lid.

Steaming: Vegetables cooked in steam do not lose as much of their water-soluble vitamins and mineral salts as those that are boiled. Steaming is a good method to use for strongly flavoured vegetables such as turnips and onions. Steaming under pressure, as in a pressure cooker, shortens the time needed for cooking considerably. Care must be taken not to over-cook. All root vegetables are suitable for steaming.

Boiling: Boiling is a method very commonly used. To cook properly in this way vegetables should be prepared by being thoroughly washed and scrubbed or peeled very thinly, if necessary. Put them into a saucepan containing a small amount of boiling, salted water. Bring to the boil again and cook until the vegetable is tender but still crisp and retaining its shape. Too much water and too long a cooking period, particularly if the water is kept fiercely boiling instead of gently simmering, will ruin the best vegetables. A close-fitting lid should be used. To avoid loss of vitamins and minerals, use the vegetable water in soups, stews, or gravies. This method of

The bright idea that created a problem

The man who first thought of aerial top-dressing certainly started something. This new technique, pioneered and developed in New Zealand, placed new resources into the hands of producers—and created new problems for transport organisations.

In 1950, about 5,000 tons of artificial fertilisers were distributed from the air over a little less than 50,000 acres of land. So remarkable were the results that, within *six years* the figures had increased no less than *eighty-fold.*

The fact is, that on suitable land, a farmer's wool clip can in five years be substantially increased and possibly doubled in weight by aerial top-dressing combined with oversowing and (in many cases) the provision of additional fencing and irrigation. In livestock farming, too, equally substantial improvements result.

That was the 'bright idea'.

Now for the problem.

Before the producer can profit by his enterprise, his output must be carried to the waiting markets of the world. And so increased output calls for increased transport facilities by road and by rail and increased handling capacities at freezing works and harbours.

And, in the final analysis, it will call for an increased service of ships. That, in turn, may mean building more new ships and every ton of new shipping calls for a capital provision by the Lines of £250, for in these days an average refrigerated cargo liner will cost every penny of £2,500,000.

One thing, however, is certain. The increased output which follows the use of new production methods will continue to flow smoothly and surely from New Zealand to the markets of the world. In co-operation with Produce Boards, Railways and Harbour Authorities and the waterside workers, the ships will keep New Zealand's life-line open.

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cooking is suitable for all root vegetables.

Braising: Braising is a method used very much with onions, which give such good flavour to stews and casserole dishes. The onions should first be sauted in a very small quantity of hot fat (just enough to turn them golden brown). Any excess fat is poured off and the vegetables continue cooking, either simmering gently in a stew or put into a casserole dish with added stock to cook slowly in the oven with the lid on. Other root vegetables, such as carrots and parsnips, are suitable for braising.

Roasting and frying: These methods of cooking root vegetables bring out still other textures and flavours and are generally popular ways of cooking. There is usually a greater loss of vitamin C in this way and if the cooking is not done carefully, the vegetable will absorb too much fat, making it unappetising and indigestible. However, if the fat is heated to the right temperature and vegetables cooked to a crisp, golden brown with all the fat drained off before serving, the result is generally pleasing, both to the eye and the palate.

RECIPES FOR ROOT VEGETABLES

Root vegetables most commonly used in New Zealand are Jerusalem artichokes, onions, potatoes, kumaras, carrots, parsnips, turnips and swede turnips, and beetroot. Strictly, the first four vegetables listed are not root vegetables; Jerusalem artichokes, potatoes, and kumaras are tubers and onions are bulbs. However, as this article deals mainly with commonly used vegetables the edible portion of which grow underground these have been included in the list.

A few general rules have been given for the ways of cooking most commonly employed; the recipes that follow have been chosen to show less common methods of preparation and cooking.

Jerusalem Artichokes

These roots are perhaps not quite so well known in New Zealand as most of the others. They are rather sweet and have a definite flavour of their own. They should not be peeled and boiled in large quantities of water, as this tends to make them watery and flavourless, and may account for their general unpopularity.

Jerusalem Artichokes Buttered

1 lb. of artichokes
1 oz. of butter

Sauce

½ oz. of butter
4 oz. of milk
Salt and pepper
½ oz. of flour
Pinch of nutmeg

(4 servings)

Wash and scrub the artichokes, but do not peel. Put into a saucepan of water, barely covering them, and bring to the boil. Strain off the water. The skins can then be rubbed off.

Put the butter in a small roasting dish. Cut the artichokes into small pieces. Place in the pan with the melted butter and put in a moderate oven (350 degrees F.) for approximately 20 minutes or until the artichokes are cooked but still firm. Make a roux sauce with the butter, flour, milk, and pepper and salt. When the artichokes are cooked drain off the butter, pour the sauce over them, sprinkle a little nutmeg on top, and leave in the oven to cook gently another 10 minutes.

Stuffed onions with rice filling. This shows how the centre of the onion can be removed after parboiling and how the onion shell can be kept in shape by a thin skewer.

French Recipe for Jerusalem Artichokes

1 lb. of artichokes
1 medium sized onion
½ pint of water
Salt and pepper
½ pint of milk
2 tomatoes (sliced)

Sauce

½ oz. of butter
1 cup of liquid from the vegetables
1 oz. of cheese
Chopped parsley
½ oz. of flour
Salt and pepper

(4 servings)

Scrub the artichokes and bring to the boil in a saucepan of water. In another saucepan put the milk and water, add the onion peeled and chopped, and seasoning, and bring to the boil. Strain the artichokes, rub off the skins, and cut them into smaller pieces. Add these to the onions, cover, and simmer for 20 minutes.

Make a roux sauce with butter and flour and a cup of the liquid in which the vegetables were cooked. Season and add grated cheese. Peel and slice the tomatoes. Drain the artichokes when cooked and put into an ovenware dish. Add the sliced tomatoes. Pour over them the sauce and sprinkle with parsley. Put into the oven for a few moments to heat thoroughly before serving.

Beetroot

This vegetable is most commonly cooked and served cold in various ways (sliced, diced, or jellied) with salads. However, there are various ways of preparing hot dishes from it and recipes for some follow.

Buttered Beets

For this recipe choose tender young beets. Wash and scrub them carefully but do not break the skin. Cut the leaves off about 1 in. to 2 in. above the stem ends of the roots. Do not cut the taproot. Cover the beets with water in the saucepan and boil gently with the lid on until tender. Drain, cool quickly under cold, running water, and slip off the skin and stems. Slice or cube the beets. Melt a little butter in a saucepan and add the cut up beet and a little chopped mint. Heat through and serve hot. If the stems are young and tender, they may be quickly cooked in boiling water, strained, and served separately with a knob of butter and seasoning.

Harvard Beet

2 cups of cooked beetroot, skinned and cubed
½ oz. of butter
1 cup of milk
2 teaspoons of sugar
½ oz. of flour
2 tablespoons of vinegar
Salt and pepper

(4 servings)

Make a roux sauce with the butter, flour, and milk. When thickened add vinegar, salt and pepper, and sugar. Stir in the cubes of beetroot. Serve hot.

Beetroot in Potato Rings

2 cups of finely sliced or diced cooked beetroot
½ lb. of potatoes
1 oz. of butter
6 oz. of milk
Salt and pepper
1 small onion
1 oz. of flour
2 tablespoons of vinegar

(4 servings)

Put the butter in a frying pan and heat until melted. Add chopped onion and cook gently. Sprinkle in the flour and stir with a wooden spoon until well blended. Add salt and pepper

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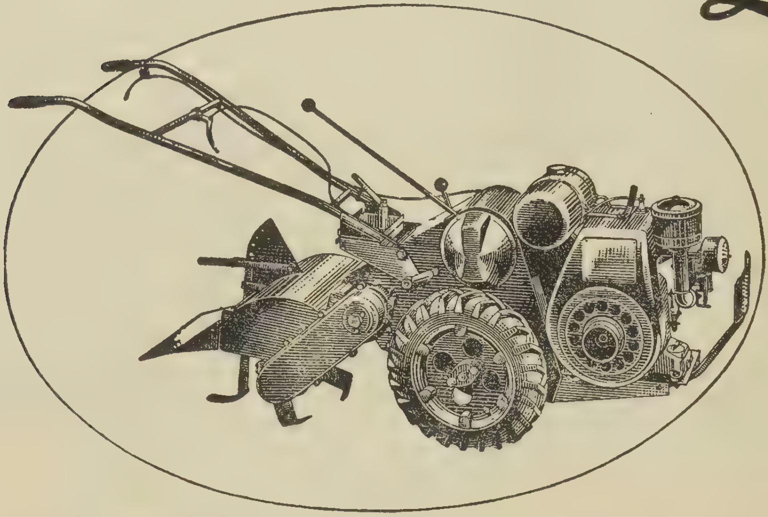

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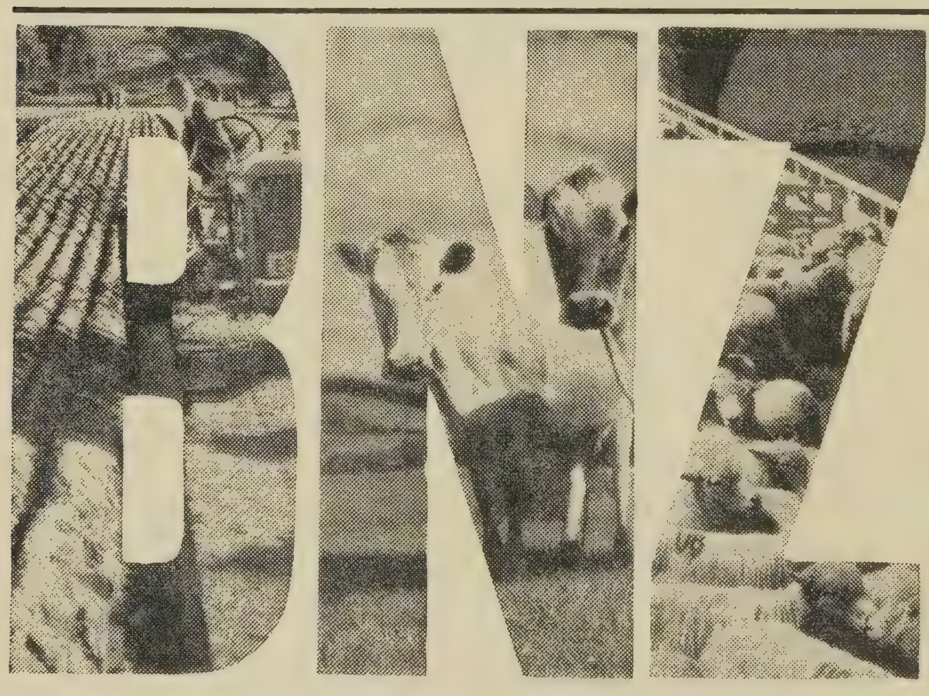

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and milk, stirring constantly until thickened. Simmer for 2 minutes. Take off the heat. Add the beetroot and vinegar and stir well. Cook the potatoes and mash them. Make a ring of mashed potato in an ovenware dish. Pour the beetroot mixture into the middle of the ring. Put a few dabs of butter round the potato and put the dish in the oven until the potatoes are a crisp, golden brown.

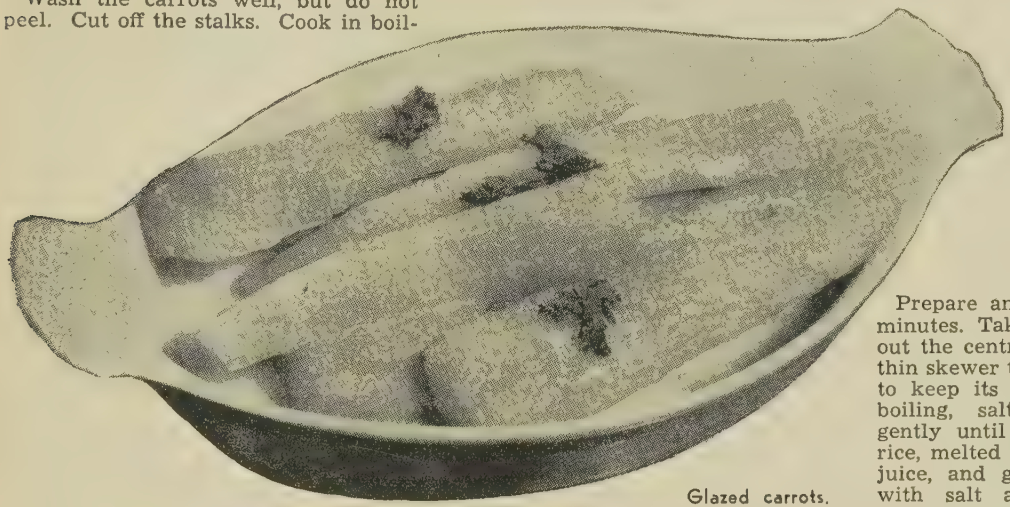
Carrots

Carrots are one of the most useful of vegetables; they are colourful, tasty, keep well, and are a good source of vitamin A. They are suitable for the table prepared in many different ways, both cooked and raw. The recipes given below make simple and attractive dishes.

Glazed Carrots

1 lb. of small, young carrots
2 tablespoons of sugar
2 tablespoons of butter
Chopped parsley

Wash the carrots well, but do not peel. Cut off the stalks. Cook in boiling, salted water (barely enough to cover them) until tender. Cook with the lid on. Drain and dry well in a clean tea towel. Heat the butter and sugar in a saucepan, taking care not to burn or discolour it. Add the carrots and simmer gently, turning them frequently until they are glazed. Serve sprinkled with chopped parsley.



Glazed carrots.

Savoury Carrot Fingers

1 lb. of medium-sized carrots
1 medium sized onion
½ oz. of flour
Salt and pepper to taste
½ oz. of butter
1 cup of stock or vegetable water
1 teaspoon of lemon juice
Chopped parsley

(4 to 6 servings)

Wash the carrots well and scrape if necessary. Slice thinly and cook until tender in a small amount of boiling, salted water. Peel and chop the onion finely and saute in a pan with a little butter. Then add the rest of the butter, melt, take off the heat, and add the flour, mixing until there are no lumps. Add the stock and return to heat, stirring continually until thickened. Add lemon juice and seasoning. Drain carrots well, place on strips of hot buttered toast, and pour the sauce over them. Sprinkle with parsley and serve hot.

Baked Carrot Pudding

1 cup of grated raw carrot
1 teaspoon of ground nutmeg
½ teaspoon of allspice
4 eggs
½ cup of brown sugar
3 oz. of butter
¼ cup of fruit juice or ¼ cup of cooking sherry
1 cup of dry breadcrumbs
1 teaspoon of ground cinnamon

(4 servings)

Place the dry ingredients except the sugar in a bowl and pour the fruit juice or sherry over them. Beat the eggs and sugar until light and fluffy. Add the butter (melted) and mix it with the other ingredients. Put into a greased pie-dish and bake in a moderate oven (375 degrees F.) for about 45 minutes. Serve with custard or cream.

Onions

Onions are not often eaten raw except in the form of spring onions, but are cooked in every way—boiled, baked, roasted, fried, sauted, or braised. Two recipes for stuffed onions follow. These may be served on their own as a luncheon or tea dish.

Stuffed Onions with Mushrooms

4 onions
2 hardboiled eggs
½ oz. of butter
2 tablespoons of breadcrumbs
¼ lb. of mushrooms
Juice of ½ lemon
1 cup of stock
1 teaspoon of mixed herbs
Salt and pepper
½ oz. of butter

Peel the onions, taking off only the outer skin. Cut a fairly thick slice off the stem end. Put into a saucepan, cover with water, and add lemon juice and salt. Cover and cook gently about 10 minutes. Take the onions out and carefully remove the centre from each one, leaving a hollow cup. Chop up the centre pieces small. Chop the hardboiled eggs into small pieces, mix these together with the mixed herbs, ½ oz. butter, salt and pepper, and breadcrumbs. Fill the hollow cups with this stuffing and stick a fine skewer through each onion to hold it in shape. Put the onions in an ovenware dish, pour the stock over them, and cook in a moderate oven (375 degrees F.) for about 1 to 1½ hours. Cook the peeled mushrooms in the second ½ oz. of butter and place these round the stuffed onions when serving. If mushrooms are not available, a good substitute can be made up from a packet of dehydrated mushroom soup. Thicken it slightly with flour, if desired, and pour round the onions as a sauce.

Stuffed Onions with Rice Filling

4 large onions
Juice of 1 lemon
Salt and pepper
1 tablespoon of chilli sauce
1½ cups of cooked rice
2 tablespoons of melted butter
¼ lb. of grated cheese

(4 servings)

Prepare and cook the onions for 10 minutes. Take out and carefully scoop out the centre of each onion. Stick a thin skewer through each hollow onion to keep its shape. Put in a pan of boiling, salted water and simmer gently until tender. Combine cooked rice, melted butter, chilli sauce, lemon juice, and grated cheese and season with salt and pepper. When the onion cups are soft, drain carefully and fill with the rice mixture. Put in a shallow, greased pan and sprinkle the tops with a little more grated cheese. Put under the grill until a golden brown.

Parsnips

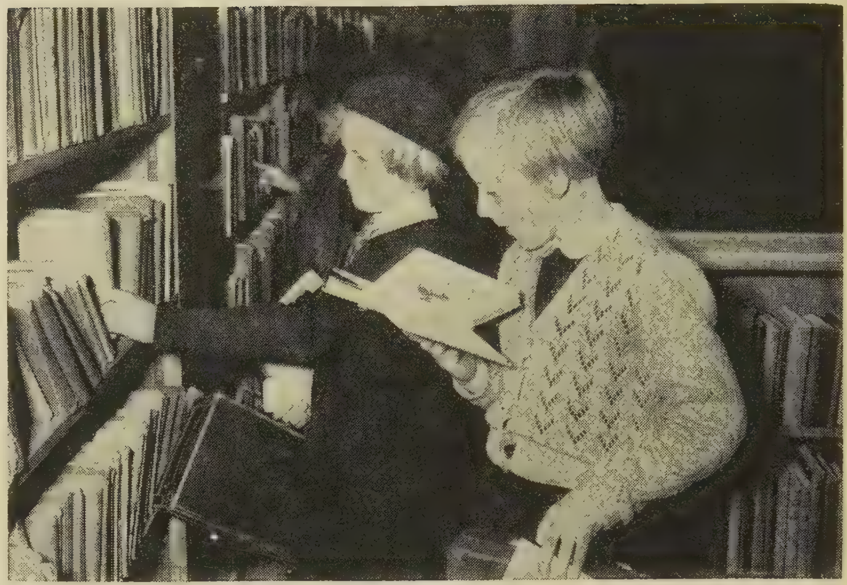
Parsnip Souffle

1 lb. of parsnips
2 eggs
Pinch of ground nutmeg
1 cup of thick white sauce
Salt and pepper

(4 servings)

Peel and wash the parsnips, slice, and cook in boiling, salted water until tender. Strain and rub through a sieve. Mix the parsnip puree with the white sauce. Separate the eggs, add the beaten egg yolks to the puree, and season with salt and pepper. Beat the egg whites until stiff and fold into the mixture. Turn into a greased souffle dish and sprinkle the top with grated nutmeg. Bake in a moderate oven (375 degrees F.) for about 30 minutes. Serve immediately.

All Country Districts Should Have Children's Libraries



Children's Book Week

Children's Book Week is to be observed in New Zealand this year from Monday 25 August to Friday 29 August, when attention will be focused by displays and talks on the good books which are available to children.

Rural residents who wish to establish libraries for country children can obtain help from the Country Library Service of the National Library Service. The way one rural community sought this help and went about starting its own children's library is described in this article by **Myrtle Woodley.**

A HOME without books is like a table without food and it is more difficult to satisfy a growing mind than a growing body.

OUR children were very keen readers, having had their appetites whetted by the facilities of the suburban library scheme which Christchurch offered, and when we moved to the country it was a great blow to find no children's section in the local library.

Someone told us we could become country subscribers to the Christchurch Public Library children's section and this we did. This, by the way, is an excellent service. For 10s. a year per family 2 books per child can be borrowed and kept if needed for a month. Probably many more country families could avail themselves of this service. Of course 2 books monthly (even if one can get to the city so frequently) is not nearly enough to keep the average youngster going and so we continued to lament the local book famine.

The next step seemed obvious: Why not a local library for children? A talk with Miss D. K. Bowsher, Children's Librarian at the Canterbury Public Library, led me on to the National Library Service. Straight away they offered to lend 60 books and to change them twice yearly (this was for approximately 200 children of 4 to 16 years of age) and that settled the matter. A children's library was possible; 60 books just waiting to be sent when the word was given. Who could resist it?

Committee Formed

This information was passed on to the Anglican Young Wives' Group and with their backing a committee representing the Presbyterian Women's Fellowship, the Women's Institute, Anglican Young Wives' Group, School Committee, and the Home and School Association was formed. (These happened to be the local groups connected with or interested in children.)

From then on the community rose to it.

The local adult library committee offered a room in their building for a children's section. Someone produced old bookshelves from the junk shed; birds had been nesting happily in them. The local artists made posters asking the people for donations: "Help Widen the Children's Horizons", etc., and they did give generously; £60 was soon collected and a further £40 was raised by a cake and produce stall.

Both the Canterbury Public Library and the National Library Service were keen to help in every way. The National Library Service lent books on organisation and offered to help with the selection of books. It was a relief to share this responsibility with a trained librarian when doing the rounds of the Christchurch bookshops.

Miss Bowsher spoke on children's reading to a group interested in promoting the children's library scheme and illustrated her talk with plenty of books.

Results after a Year's Work

In 2 months the library was opened. The room looked very attractive with its polished floor, varnished shelves, the absence of cobwebs, and the books in their clear plastic covers. Now after a year's work we have 400 books in stock, 80 more on order from overseas, permanent shelving, and a display stand. Twelve women give an hour once a month to run the library and they do enjoy their sessions. To allow the children to change books twice weekly we open the library during 2 lunch hours for the bus children, twice after school for local children, and once before school for the convent children, who travel to the next town for schooling.

We have made a beginning: The children of our district are being given free access to good books and in a limited way we are meeting the local book famine and providing nourishment for young minds.

All country districts should and could have children's libraries. Reading is important. Think what great pleasure it provides for leisure hours and, more than that, it can enrich lives with a wealth of accumulated experience and knowledge.

There are plenty of experienced librarians to help you, but it depends on you to set the ball rolling.

Preparing Flowers for Showing

WITH the coming of spring and new growth in the garden many people will be thinking of the flower shows to be held through the season until about April. Those who have exhibited before will have few qualms, but many beginners may perhaps be wondering just how to go about this very interesting branch of gardening. In this article Elspeth Gray, formerly Horticultural Instructor, Department of Agriculture, Auckland, discusses preparing flowers for showing. The section which deals with routine work for September is by Rosalie A. Campion, Horticultural Instructor, Department of Agriculture, Wellington.

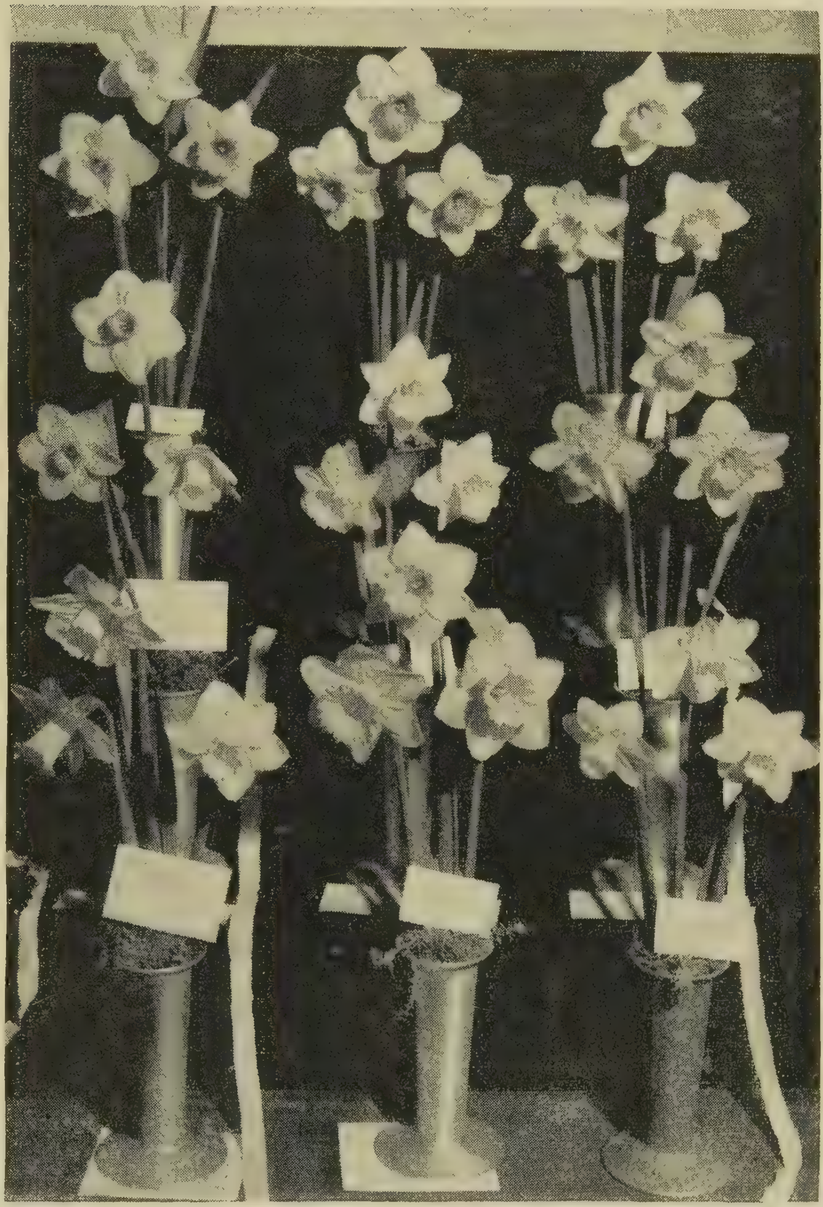
THE show schedules are usually sent out some time before the date of the show and it is a good idea to read them very thoroughly not only to pick out the classes for entry but also to become familiar with the rules and regulations laid down. It is most disappointing to have a good exhibit disqualified on some technical point because the rules were not read properly.

If show dates are known well in advance, plantings may be timed to produce flowers at about the correct time in a normal season. In any case, the date of the show will be a help in deciding what flowers will be at their best at that time. It is a good plan to make a further check 10 days or a week before the show, as by that time a fairly clear idea can be obtained of what will be ready.

Usually there are 3 groups of classes open to amateurs: those for specimen blooms, those for collections (for instance, 6 named varieties of roses, 3 of each variety), and the decorative classes.

If not very much work has been done with decorative arrangements, it may be better to forgo entering in that class for the first one or two shows and, instead, to study the winning entries to get ideas from them as to the principles of flower arrangement.

As a rule though, the average housewife uses flowers in her home and probably has containers in which flowers can be arranged very easily and effectively. Until experience is gained the best plan to follow, when entering the decorative classes at a show, is to arrange the flowers as they would be done for use in the house provided that they comply with the schedule.



▲ An attractive exhibit of named daffodils. The flowers have been well staged, but there is too much sphagnum moss showing above the edges of the containers. Sparrow photo.

Selecting the Flowers

If special blooms are needed for entering in a specimen class and they appear to be opening too quickly, they may be picked when they are about half open. When placed in a cool, dark, well ventilated room they will remain only partially open for several days, provided that there is plenty of water in the container. When flowers have been kept like this they will open very quickly once they are placed in a warm room or hall, so if it is possible, freshly picked blooms should be used.

Either in the morning or evening of the day before the show all the flowers required should be picked with a few extra to allow for damage in carrying.

All flowers should be cut with sharp secateurs and with a sloping cut at the base as, if they are cut square, the bases of the stems will rest on the bottom of the container and may not absorb much water.

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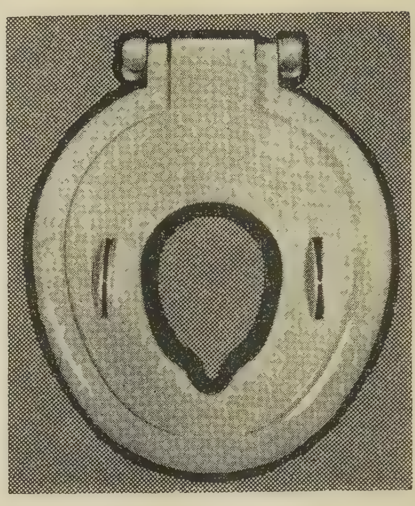

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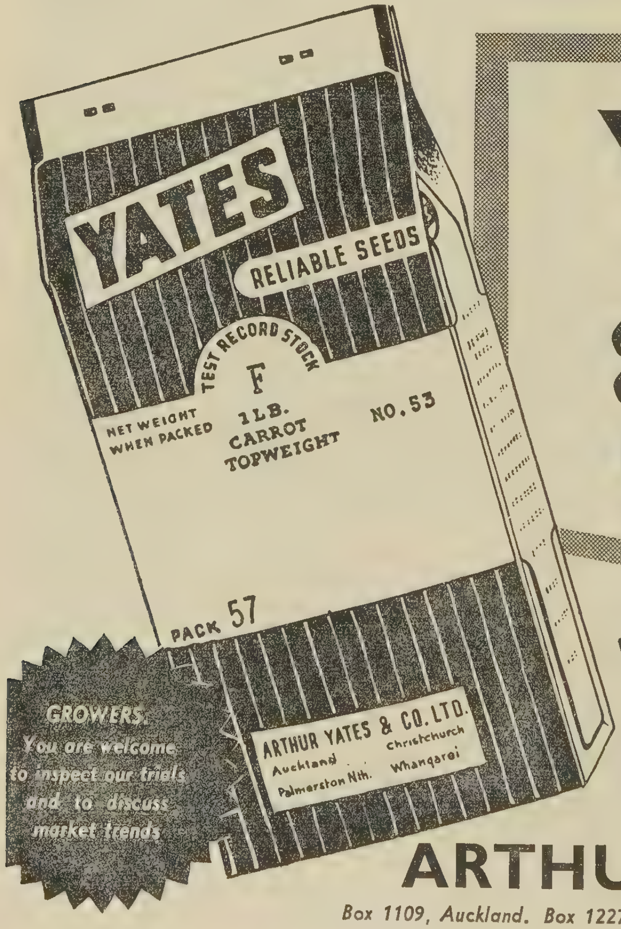
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It is best to pick the flowers and put them straight into water, so buckets or similar containers should be available on the spot. The flowers should have at least 4 hours in water nearly up to their necks before being taken to the show. By that time they will have absorbed enough water to keep them fresh for some hours. It is better to pick all blooms with stalks as long as possible, as it is much easier to cut more off than to spend time staging a bloom with a stalk that is too short.

Containers

Where containers are supplied for the staging of blooms, as is usual, it is a big saving for the exhibitor, and often means that more entries can be submitted than if containers were not available. Where they are not supplied the size selected should be suited to the size of the flower. Sometimes, for example, a single daffodil is staged in a quart preserving jar and the container is quite out of keeping with the size of the bloom.

For the decorative section, of course, exhibitors must supply their own receptacles, the correct size of which for each class should be clearly outlined in the schedule. If decorative work is being entered for the first time, it is a good idea to obtain suitable receptacles some time in advance and practise the arrangements, flowers and bits of twigs and leaves being used, to get a clear idea of how the finished entry is to be set up. If that is done, the arrangement can be prepared quickly and with a minimum of handling on the day of the show and will be much brighter and fresher. For line arrangements, especially, it is preferable to pick the flowers with stems of varying lengths, as they are then easier to arrange and it is also a more economical use of the blooms.

In country districts, where the hall may be some distance away, the flowers will have to be handled carefully to avoid injury to them in transit. A large, flat box will prove very useful for this purpose when lined with several thicknesses of newspaper. The flowers should be placed carefully in layers according to size.

An easy way to transport most specimen blooms is to place them separately in jars labelled with the number of the class. The jars are then put in a divided carton, the cardboard divisions being used to support them. Flowers such as gladioli, however, would not travel well like this, as they are too top heavy. Several spare blooms should be included for each class.

Staging

In staging flowers the main aim is to show them to the best advantage. Specimen blooms should face the front and be firmly fixed in the container so that they will not fall over if it is moved. Sphagnum moss is excellent for this purpose. It may be used to fill the container and hold the stem firm, provided that none of it is over the lip of the container when the exhibit is staged. Where the vases are constricted in the centre it is not necessary to fill the vase with sphagnum moss. The moss should be rolled into a ball and gently pressed into the vase until it is held by the constriction.

In classes calling for a group of a certain variety it is better to arrange the exhibit in the maximum number of containers permitted by the schedule than to spoil the exhibit by putting too many blooms into one vase. Stewards will give guidance where this is not specified in the schedule.

In 3-tiered staging in a class of perhaps 6 different roses the brighter colours should be placed at the top, at the same time care being taken to see that the blooms are staged so that the colours blend satisfactorily not only in the exhibit but also with the flowers on either side, if that is practicable.

Where there is a slight difference in the size of the flowers the larger ones should be placed at the front, as if they are at the top, the exhibit may look top heavy. An exhibit with blooms of uniform size will always look more attractive than one with some very big and some very small blooms.

For decorative work it is sometimes possible to provide a back drop other than black, which is the standard one, and this may enhance the arrangement. Good blooms badly staged may lose points, whereas those which are staged well to bring out their better points will always be attractive. The exhibit must be arranged carefully, because if there is close competition, the quality of the staging may be decisive.

The main points to remember when showing flowers are to use good blooms and to stage them well. The stems should be cut to an optimum length. If they are too short, the flowers look out of proportion, and if too long, the general effect may be top heavy.

Duties of Stewards

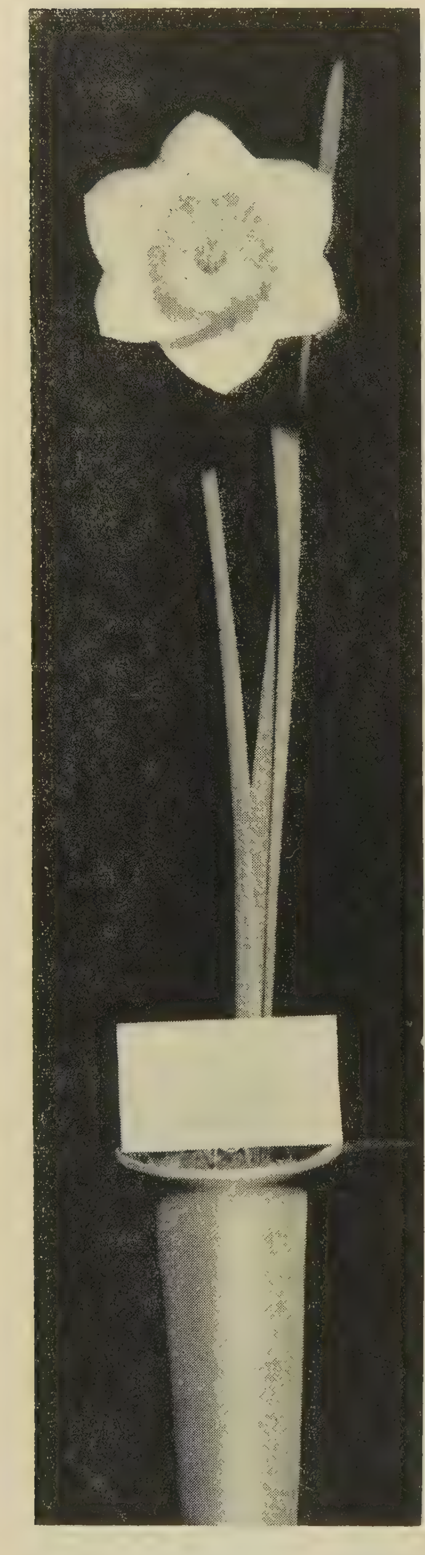
MORE people may be prepared to assist as stewards at shows, especially smaller country shows, if it is appreciated that the duties and responsibilities are neither onerous nor very difficult. An outline of those functions may help by giving confidence to some who, however willing to assist, have felt unable to do so because they lacked experience. Broadly, the duties of a steward are:

1. To ensure that all exhibits are correctly identified and are placed in the places allotted to them.
2. To assist the judge by clearing the hall (or the vicinity of the class being judged) of all unauthorised persons before judging starts.
3. To be thoroughly familiar with the layout of the section and be able to answer questions with respect to the requirements of the schedules.
4. To refrain from making comments on entries unless asked for them by the judge.
5. To record properly and accurately the placings awarded by the judge.
6. To replace exhibits carefully and tidy the section when judging is completed.

The first duty of a steward is to become thoroughly familiar with schedule details respecting the section for which he is responsible, and to know exactly where entries in each class are to be staged. He must fully understand the system of identification of exhibits and also the method of recording and displaying awards made by the judge.

Before the judge enters the hall (or section) the steward must check over his section and ensure that all identification cards are turned face downward (usually the face of a card contains details including the name of the exhibitor and space for the judge's award, with only identification numbers on the reverse side). As soon as judging of the class is finished the steward should turn the entry cards face upward, mark the judge's awards on the cards, and without delay make corresponding entries in the notebook or schedule provided by the secretary.

If a premier bloom is to be selected from a group of classes, it is the steward's duty to place the required blooms, with their cards from the various classes, on a table or space reserved for them. After the premier bloom has been chosen the entries plus cards must be returned to their original positions. On all other occasions when entries may have to be moved in the course of judging the cards must always be moved with them to obviate any chance of mistake.



[*Sparrow*

An excellent specimen bloom of a pink-cupped variety.

It is a sound policy to remain in the hall until the last minute. Exhibits may have to be moved or some detail attended to, and to leave the hall as soon as the blooms are staged could mean possible disqualifications. Stewards, however, are usually allowed to move exhibits to assist the judge.

All exhibits in the show should be clearly labelled with the name of the variety if it is known. This means extra work when there is little time to spare, but in the event of very close competition clearly and correctly named exhibits will usually have an advantage.

Where collections of shrubs and perennials are being entered exhibitors should make sure that they are what is asked for in the schedule. If the wording is ambiguous, the steward's ruling should be asked for. Most judges will be quite willing to discuss the flowers and the reasons for the placings afterward.

The following are points to look for when flowers are being picked for showing.

Daffodils

As with all blooms being picked for exhibition individual flowers of each variety will differ slightly, and great care must be taken to select only those that are as near perfect as possible.

In the modern show narcissi the perianth is an important feature and it should be flat and set at right angles to the corona (trumpet). Viewed from the back, twisted and badly placed petals are easily seen and, as nothing can be done to correct these faults, such flowers should be discarded. Any segments that have nicks or split edges reduce the quality of the flower, as will those that are ribbed. The corona should be circular. If it is not completely symmetrical, it may be made so by careful manipulation.

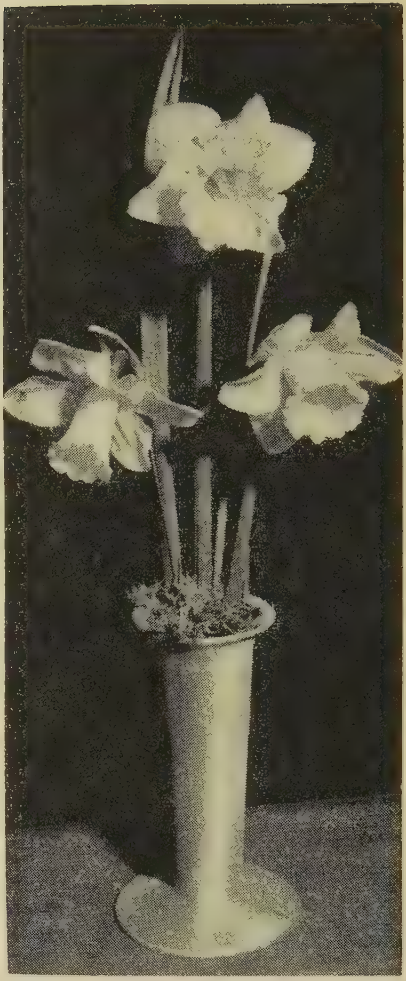
Slight rain and mud splashes may be carefully brushed off, but if they are too heavy, it is not worth the effort. Brilliance of colour is very important and if the flower is exposed to hot sunshine, it will soon become pale and muddy looking. Red cup varieties for showing should be picked as soon as they open or must be shaded from sunlight. All other things being equal, the best coloured flower will usually win.

When cutting the bloom choose a length of stem to match the size of the flower and show it to advantage. A strong stem without any twisting or distortion, though not so thick as to look clumsy, is the ideal.

The flower should face straight ahead and neither hang its head nor lift it above the horizontal.

Gladioli

Until fairly recently opinions on judging gladioli varied, but now there are standard rules. If the following points are looked for when picking, the blooms should be well up to show standards.



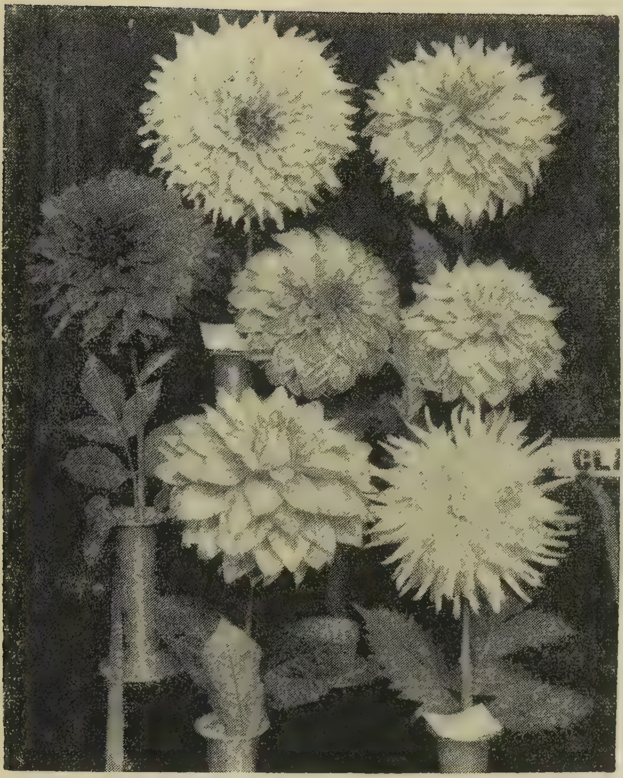
[*Sparrow*

A poor exhibit; the flowers are of uneven sizes, the stalks are too short for the size of the flowers, and too much sphagnum moss is showing.

A good spike should have a straight stem and flower head so that when staged the flowers are shown to their best advantage. At least 5 flowers should be open from the base, the ideal being to have them in varying stage of opening. They should all face forward and be evenly spaced so that the stem is hidden when the blooms are fully developed. The spike should be at least up to the average for the particular variety both in its length and the size of the individual flowers.

An overall fresh and clean appearance should be aimed at. Usually a leaf of gladiolus is placed on each side of the spike to set off the flowers.

Faults to avoid are lower flowers wilted or removed, damaged petals, and any that are streaked or flecked, indicating that virus is present. Spikes with bent or crooked stems should automatically be discarded except for



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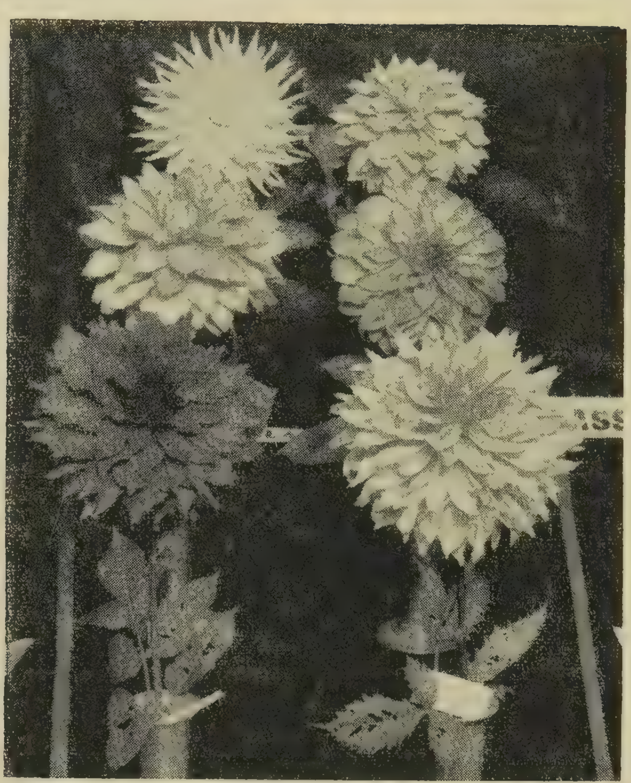
A group of giant decorative dahlias badly staged, with the largest bloom at the top. The flowers are all facing in different directions, a fault to be avoided whenever possible.



[*Sparrow*

Giant decoratives that are staged better than in the illustration at left, but are marred by the damaged leaves of the front two blooms.

the primulinus types which very seldom have perfectly straight stems.

When gladioli are picked and left overnight in a different position the top will usually bend, spoiling the effect of an otherwise excellent spike. Further information on exhibition gladioli was given in the February 1956 issue of the "Journal".

Roses

It is sometimes hard to discard a rose that is very nearly perfect and yet has some small blemish which will lose points on the show bench. With roses perhaps more than any other flower it pays to be ruthless when picking them for exhibition.

There are usually classes in the schedule for exhibition and decorative roses, and often there is uncertainty as to the difference. All roses are decorative, but not all of them are suitable for exhibition classes. Generally, exhibition roses have better form, substance, and size and hold their shape longer than those used solely for decorative work. They usually have more petals, which enable them to hold their shape longer, but it is not possible to give a hard and fast definition of an exhibition rose, and even judges differ slightly in their opinions.

The main points to look for in a decorative rose, which may be single, semi-double, or double, are a good clear colour, brightness, and general artistic effect. They have fewer petals than the exhibition types and therefore lose their shape more quickly.

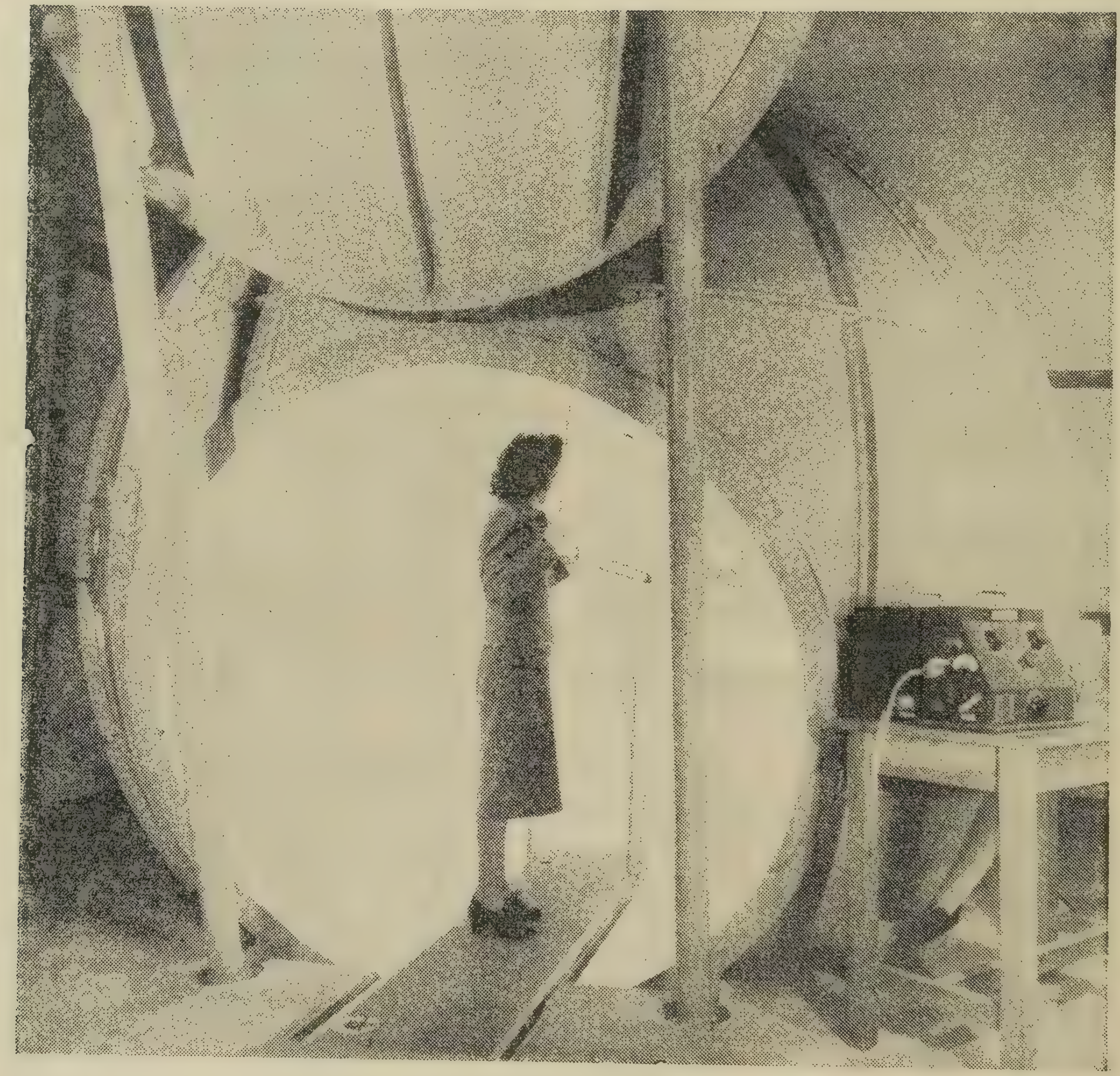
Some catalogues, when giving lists of roses, indicate ones that are suitable for exhibition. This may be of help to the amateur exhibitor. A good rose should have enough petals for that variety and they should be symmetrically arranged with a circular outline and a well formed centre. The flowers, of course, must be fresh and if they are picked half open the evening before the show, they should be at their peak by judging time.

In a self-colour rose the colours must be pure and in bi-colours such as Talisman or Peace (Mme A. Meilland) the same applies. If the overall effect is muddy or lacking in brilliance, the flowers should not be used. This is also the case when there is a break in the colour, as sometimes happens, and the bloom is not true to type. The petals must be firm, but ones that are too coarse will lose points.

The largest bloom will not always win, as it may be too coarse and therefore not a good specimen. The standard to look for is a typical well grown representative of the variety.

Where foliage is included in the exhibit it should be as clean and healthy as possible and preferably arising from the stem of the bloom, except in decorative classes. If there is too much foliage, it will detract from the flower, but there should be sufficient to show the bloom off to the best advantage. No set rules can be made as to the amount of foliage to leave, as it varies with the individual flowers and varieties. The stem should be strong enough to hold the rose upright, but should not be so heavy that it gives an impression of coarseness.

A bad rose may have poor shape, with a confused, blunt, or split centre (though a few varieties naturally have rather blunt centres) and soiled or damaged petals. Overdressing by removing outside damaged petals or artificially opening the rose so that it looks unnatural will lose points as will undersized or coarse blooms of the variety. Wiring to hold it upright will disqualify a rose when entered under the rules of the National Rose Society of New Zealand.



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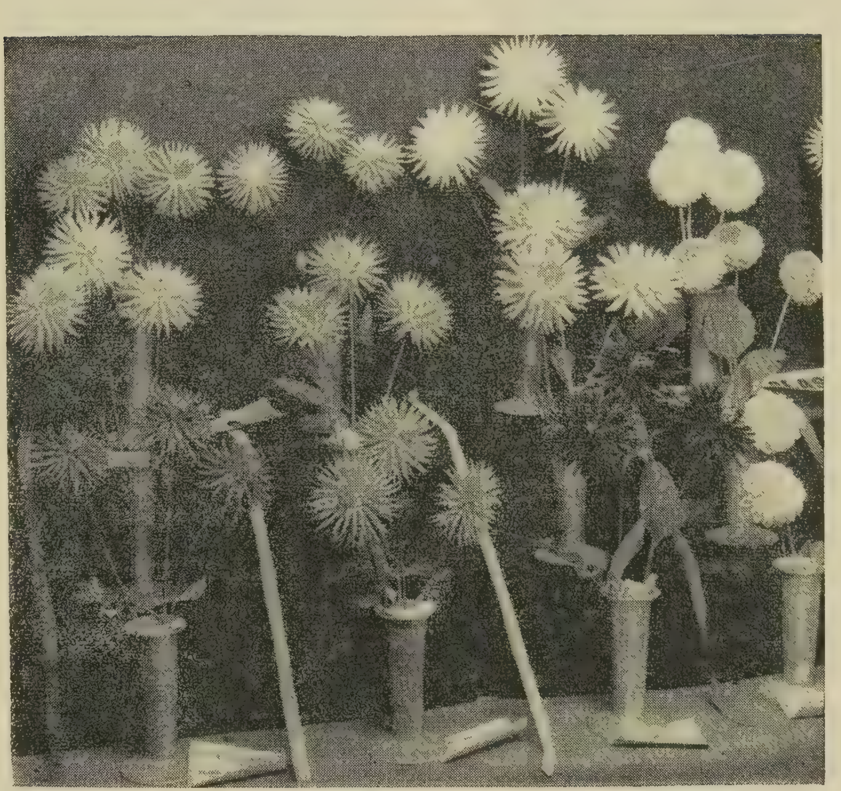
Dahlias

With the different types of dahlias, cactus, decorative, and pompones, slightly different points will have to be looked for when each variety is picked. Important points are that the head must face the front and be as nearly as possible at right angles to the stem. Frequently, especially in the giant varieties, the head either falls over too far or at the other extreme is held almost upright on the stem. In fully double dahlias the centre should not be showing in any type, as it is a sign that the flower is past its best when the stamens appear.

Judges will always look at the back of the flower to see that the florets are still fresh, so if there are any that are withered, bruised, or discoloured, the flower should not be used. The colour should be true to the variety without any streaks and the general appearance clear and fresh. Bi-colours must be evenly marked on each petal except where a particular variety has irregular markings. The following is a general guide to the classification of dahlias for showing:

Pompones, 2 in. and under across; miniature types, 5 in. and under; medium decoratives, over 5 in. and up to 7½ in.; and giant decoratives over 8 in. When staging dahlias, as with any other flowers, the exhibit should be arranged so that the colours blend and do not clash with the blooms in neighbouring exhibits. As colours are heightened by contrast, arrange the flowers if possible so that each one will brighten up the one next to it.



[*Sparrow*

An attractively staged exhibit of miniature cactus dahlias.

[*Sparrow*

Spring material arranged in a white container.

Dipping the stems in boiling water for 2 or 3 minutes as soon as they are picked, before placing them in cold water, will help to keep them fresh longer.

Chrysanthemums

Because of the wide variety of types of chrysanthemums special points must be looked for when each variety is picked. A large exhibition bloom should be both broad and deep and well shouldered with a full centre. A flower with a rich colour, freedom from "damp" spots, and with firm petals should be looked for. The eye or centre should hardly be noticed and any with more than one eye discarded. In-curving chrysanthemums should be globular with the petals incurving regularly. Stale blooms and those showing an eye, an uneven outline, or breadth without corresponding depth should not be used. Singles should have no more than 5 rows of florets, which should be broad, firm, and flat.

Brilliance of colour is to be looked for in all the flowers, and any with wilted florets either at the back of the bloom or in the centre should be avoided.

A straight stem holding the flower perfectly upright without being too thick is desirable and any with weak stems should be discarded, unless they are being used in arrangements to break the stiffness of the line. The foliage should be clean and add to the attractiveness of the entry.

Vase of One Type of Flower

Where an exhibit of blooms of one type of flower such as zinnias or gerberas is required it is better to exhibit flowers of mixed colours rather than flowers of all one colour or variety. Unless one colour or variety is required, judges will give preference to an exhibit showing a range of colours and types of that flower.

The examples given above cover several different types of flowers to serve as a guide to exhibitors and cover the main requirements.

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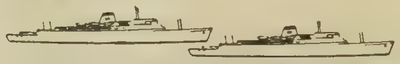

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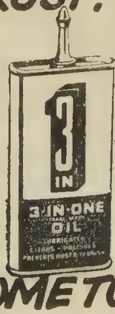

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Work for September

For the gardener September is one of the busiest months of the year. Growth, especially of lawns, is increasing: seed sowing, planting, pruning, and spraying require early attention.

Lawns

All lawn sowing should be completed before the middle of this month. Though autumn sowing is always preferable, in districts where there is no danger of summer droughts or water restrictions spring sowing can be satisfactory.

The ground will have been well consolidated by winter rains and can be lightly hoed and raked to kill germinating weed seeds. This will break the topsoil into a suitable tilth on which to sow the seed.

Experiments have shown that comparatively poor soil can produce a better lawn than a very fertile one. It is therefore unnecessary to obtain topsoil if the existing soil can be worked to a reasonable condition.

A seed mixture of 2 parts of chewings fescue and 1 part of browntop is is suitable for general lawn use and should be broadcast evenly at ½ to 1 oz. per sq. yd. After the seed is broadcast a fertiliser dressing at 1 oz. per sq. yd. of a mixture of three parts of sulphate of ammonia and 1 part of superphosphate can be made. The seed and fertiliser should be lightly raked. Lime should only be used on lawns under exceptional circumstances.

All lawns should now receive a similar fertiliser dressing to that given at seed sowing, and mowing will need to be more regular. The grass should be cut to about 1 in. high and should not be allowed to grow to more than 2 in. The cut grass should be removed and used either on the compost heap or as a light mulch on flower beds.

The regular use of fertilisers will usually keep lawns healthy and weed free, but where a lawn has become over-run with clovers and weeds it will be necessary to apply hormone weedkillers before topdressing with fertilisers.

A mixture of 2 fl. oz. of 2,4,5-T and 1 fl. oz. of MCPA mixed with water and distributed over 100 sq. yds. will kill most weeds and could be repeated at half strength in 6 months to complete the kill.

[*Elliott*

Bulbs of *Acidanthera bicolor*, which is closely related to gladiolus, can be planted from September until Christmas.

Seed Sowing

Bedding schemes should be considered and colour harmonies worked out before seeds are bought. Seed of most annuals can be sown outside during September in warm positions, but areas under eaves which suffer from raindrips should be avoided. The addition of sand and compost plus a dressing of superphosphate and lime will improve germination and resulting growth. The seed should be sown thinly, and all but the very finest seed should be lightly covered.

Now is the time for filling gaps in mixed borders by sowing a few seeds of cornflower, cosmos, clarkia, godetia, larkspur, night-scented stock, and other annuals. Where the protection of glass is available seed of African marigold, schizanthus, zinnia, dimorphotheca, capsicum, and ursinia can be sown in boxes.

Chrysanthemums from Cuttings

The taking of chrysanthemum cuttings should be continued as the growths develop (see last month's notes). When the cuttings have rooted in the sand planting into a more nourishing medium should not be delayed. The plants should be kept growing steadily to prevent the stems from becoming woody and thus poorer conductors of food.

If the final planting positions are not prepared, the plants should be transferred into boxes of potting mixture or lined out temporarily in the vegetable garden. When the plants have re-established, the tips should be nipped out to encourage side shoots.

The soil should be prepared 3 weeks before planting by working in of animal manure or compost and application of a dressing of balanced fertilisers at 4 oz. per sq. yd. being worked in.

From this early stage the plants should be sprayed regularly to combat pests and diseases with a combination of ½ fl. oz. of lindane emulsion, 1¼ oz. of thiram powder, and 4 gallons of water.

Soil Fungus

Every year the number and variety of plants which die for no apparent reason seems to increase steadily. The trouble is most prevalent after prolonged wet weather and under poorly drained soil conditions.

Two widespread fungi, phytophthora and verticillium, are known to travel through the soil under moist conditions and over a hundred hosts are known. Where plants die and on inspection their roots are found to have rotted or show dark stains in the tissue one of these soil fungi, associated with poor drainage, will probably be the trouble.

In an attempt to stop the spread of these fungi within the soil and to disinfect the soil for replanting, copper oxychloride should be applied. The application can be either as a soil drench, 1 lb. of copper oxychloride in 10 gallons of water to 5 sq. yds. being used, or as a dust at 1 lb. of copper oxychloride to 5 sq. yds. The dust can be watered in or allowed to leach into the soil.

Cypress Canker

A survey made during the last 5 years has shown that a fungus referred to as cypress canker is attacking many members of the cypress family throughout the country. *Chamaecyparis lawsoniana* and its varieties are particularly susceptible. The fungus spreads over the bark and produces cankers which cause death of any twigs and branches which become encircled, and may eventually kill trees. The cankers frequently exude gum.

Trees which have been severely attacked should be removed and burnt. If infection is noticed at a very early stage when only a few small branches have turned olive or brown before the leaves are shed, the diseased wood should be cut well below the cankered

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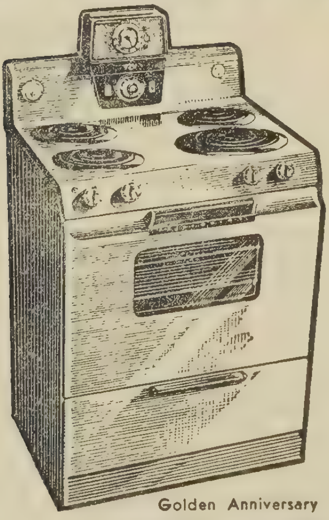

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area and burnt. Sprays of bordeaux mixture should then be applied every 6 months to reduce the spread of infection.

Layering of Shrubs

Shrubs which have young, vigorous growth near ground level are the most suitable for increase by layering. These include rhododendrons, camellias, rhus, corylopsis enkianthus, viburnums, hamamelis, and garrya. A hole should be dug below the branch to be layered and compost should be added where the branch is to lie. The branch should be slit or damaged on the top of the prospective root area and pegged down in the hole with wire. When the hole has been firmly filled it should be left undisturbed for at least a year. In the summer, watering during dry periods is advisable.

Root Cuttings

Root cuttings, from 2 to 5 in. long, depending on the plant, can be inserted in September and will quickly develop growth shoots at the top of the cutting. The cuttings need to be ¼ to ½ in. thick and should be inserted in a sandy compost with the top of the cutting at soil level. Shrubs, herbaceous plants, and alpines, including sumach, *Daphne genkwa*, verbascum, anchusa, eryngium, oriental poppy, *Anemone pulsatilla*, phlox, and campanula can be increased by this method.

Plants for Binding Sand

Gardens on very sandy soils need special attention and though autumn planting is preferable, some of the hardier plants can be planted now to help stabilise the soil. Where possible, compost should be worked into the planting hole to help retain moisture during summer. The yellow and pink achillea (yarrow), with their twitch-like roots, gazania, arctotis, catmint, mesembryanthemum, and aubretia will grow away rapidly and give a colourful display throughout summer. Sawdust or peat used as a mulch or worked into the topsoil with some blood and bone will improve conditions for growth.

Pruning

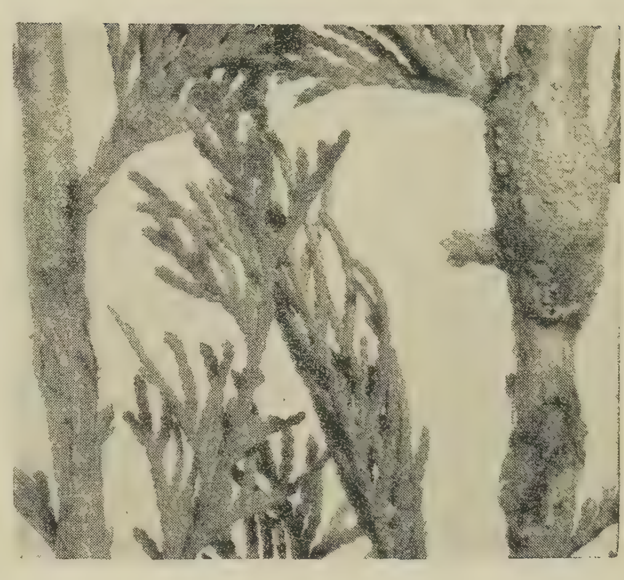
Most hedges, and especially those that have been planted this season, can be pruned back as growth begins. It is a common fault to leave hedges untrimmed for the first season, by which time they are already becoming leggy. Cutting back hard and applying a balanced fertiliser for the first 2 years will assure quick, bushy growth that will give a solid and compact hedge providing good shelter.

Evergreen shrubs such as escallonia, buddleia, euonymus, garrya, and many native shrubs should be trimmed to improve their shape.

Olearia and Pittosporum Pests

In the May issue the clipping of plants which had been attacked by olearia gall midge was mentioned. A spray of nicotine sulphate applied on a warm spring day will help in killing some of the midges which are still present.

Another group of native plants, the pittosporums, is frequently distorted by a pest known as the pittosporum chermid. These insects, which are most numerous and vigorous in September, are not unlike scale insects at first sight and form a pit where each one settles on the under side of the foliage. Young trees which have been attacked make little growth and it is advisable to spray now with lindane emulsion or lime sulphur.



Cypress cankers on *Chamaecyparis lawsoniana*, those on the right being swollen. Gum is showing on all cankers.

In the Glasshouse

In the glasshouse all varieties of annuals can now be sown. The seed should be sown thinly and after being lightly covered with compost should be watered by soaking the box in a container of water until the moisture shows through the surface of the soil.

The box should be placed on the bench and covered with glass and paper until germination has occurred. The paper and glass can then be removed. The house should be well ventilated during the day and closed in the late afternoon to retain the warmth overnight.

Tuberous begonias and gloxinias should be started into growth in boxes of moist leaf mould or compost. As the roots develop they should be potted into a compost which is high in organic matter.

General

As the flowering of spring bedding plants wanes, they should be removed and the beds can be prepared for summer flowering plants.

In colder districts fuchsias and hydrangeas can be pruned now. The severity of pruning will depend on the vigour of the plant; vigorous plants should be left with more young 1-year-old wood for flowering than weaker plants. If white cottony cushion scale is present on hydrangeas, sprays of summer oil should be applied.

Cuttings of dahlias can be rooted in sand where a little bottom heat is available. As growth begins, dahlia tubers can be divided ready for replanting.

The division of perennial plants including scabious, pyrethrum, michaelmas daisy, and phlox should be completed soon. Cuttings of delphiniums, lupins, and phlox can be rooted in sand.

Evergreen climbers such as *Hardenbergia monophylla*, honeysuckle, and ivy can be trimmed back now. Ivy plants are inclined to become top heavy, but if they are cut back hard, young shoots will quickly develop and refurnish the support.

Young seedlings can be pricked out into boxes and spaced 2 to 3 in. apart. The John Innes compost is suitable for most annual seedlings. It consists of 7 parts of good turfy loam, 3 parts of compost, peat, leaf mould, or well rotted cow manure, and 2 parts of coarse sand.

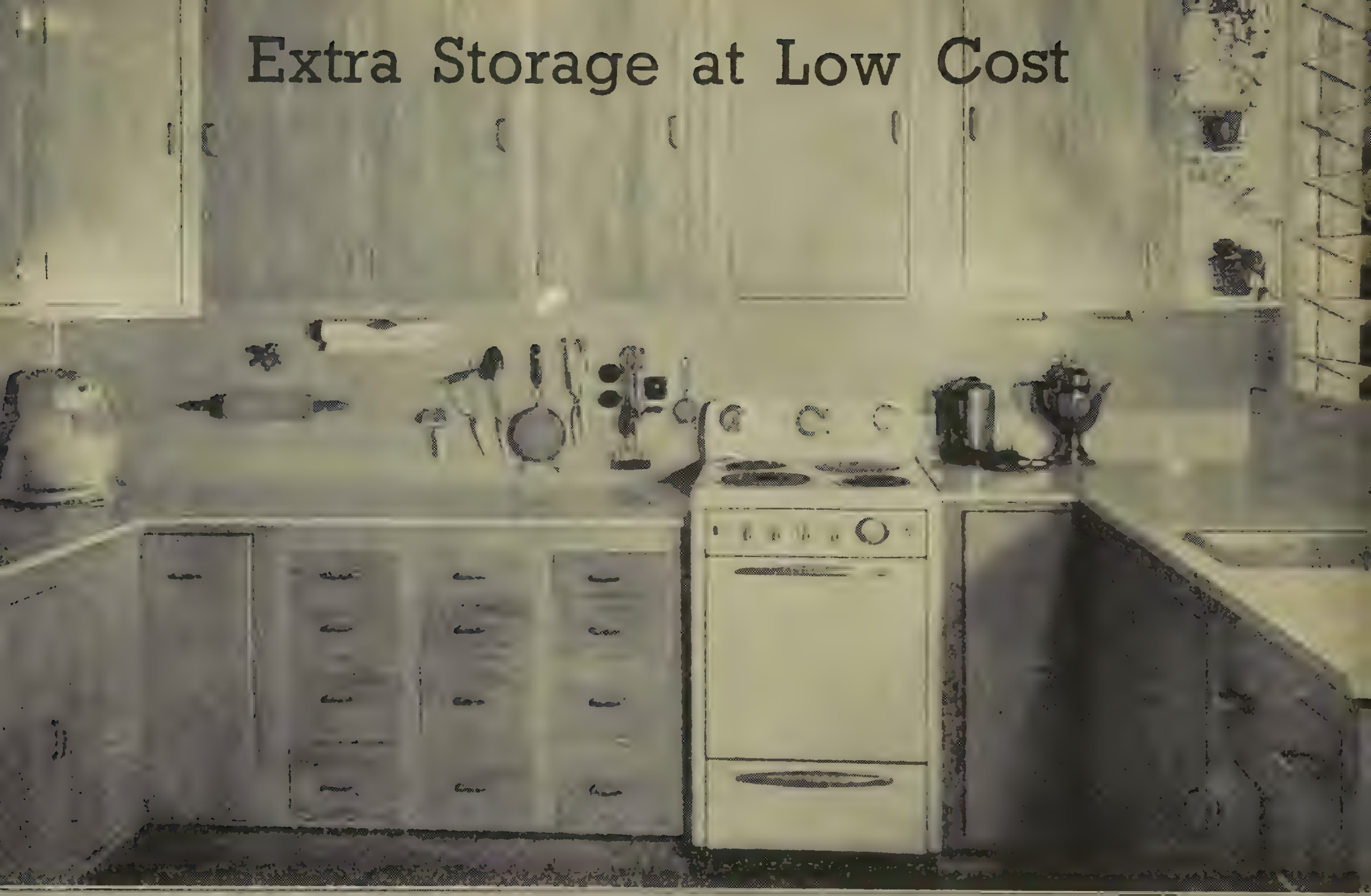
To every bushel of the mixture, about the amount which will fill an apple case, add ¾ oz. of lime and 5 oz. of a base fertiliser, which can be made by thoroughly mixing 2 oz. of dried blood, 2 oz. of superphosphate, and 1 oz. of sulphate of potash.

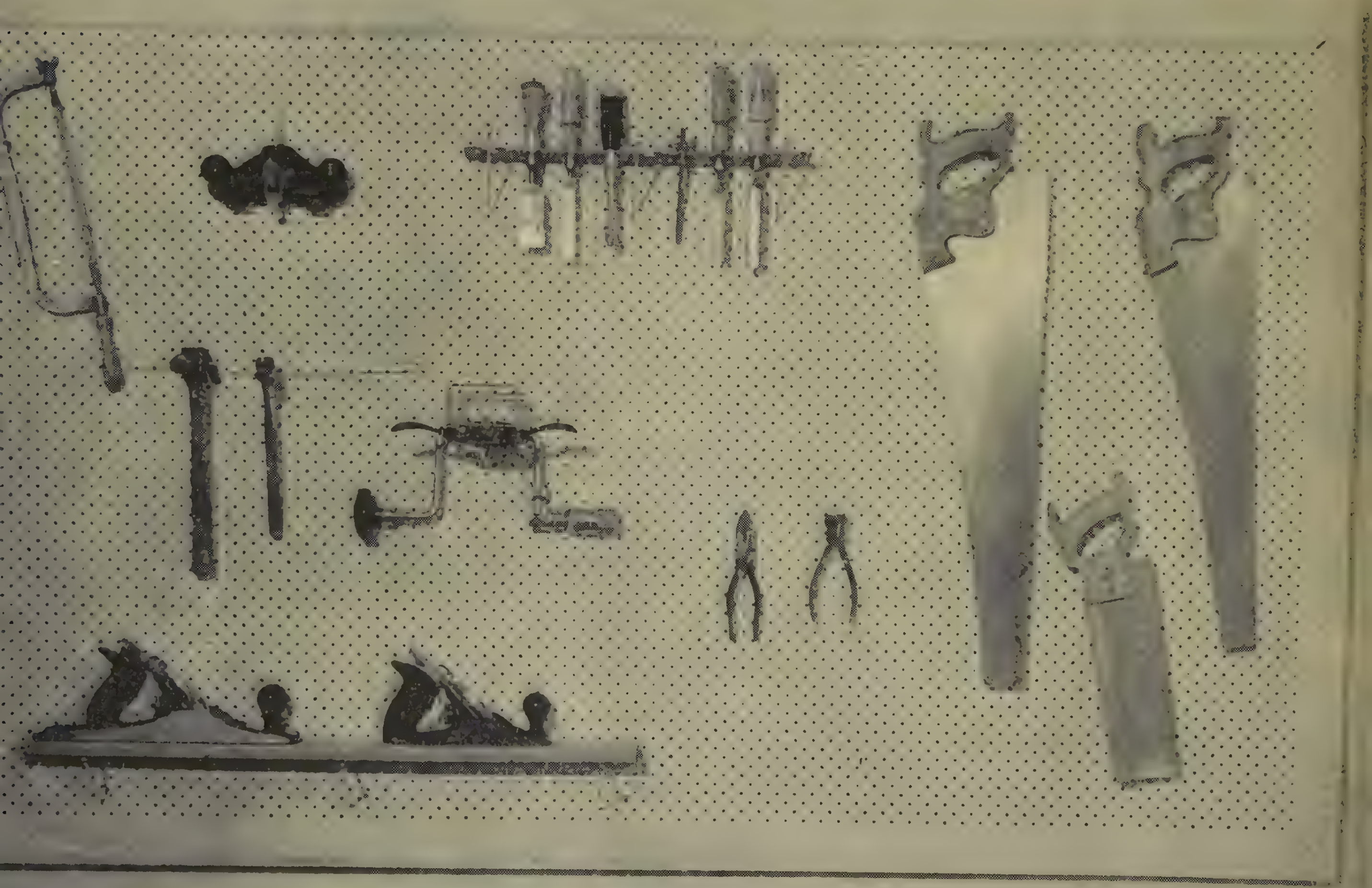
Garden pools which have become overcrowded can be cleaned out and replanted. A light dressing of bonedust can be given to established water plants.

A number of bulbs that can be planted now for flowering over the summer and autumn include gladiolus, acidanthera, agapanthus, canna, galtonia, and crinum.

It may be necessary to stake young rose growths in some districts. The young foliage should be kept covered with thiram, captan, or copper oxychloride as a protection against fungous diseases such as black spot. Sprays of lindane or malathion should be used where aphids are present.

Extra Storage at Low Cost





By ELEANOR COUSTON,
Home Science Instructor,
Department of Agriculture,
Christchurch

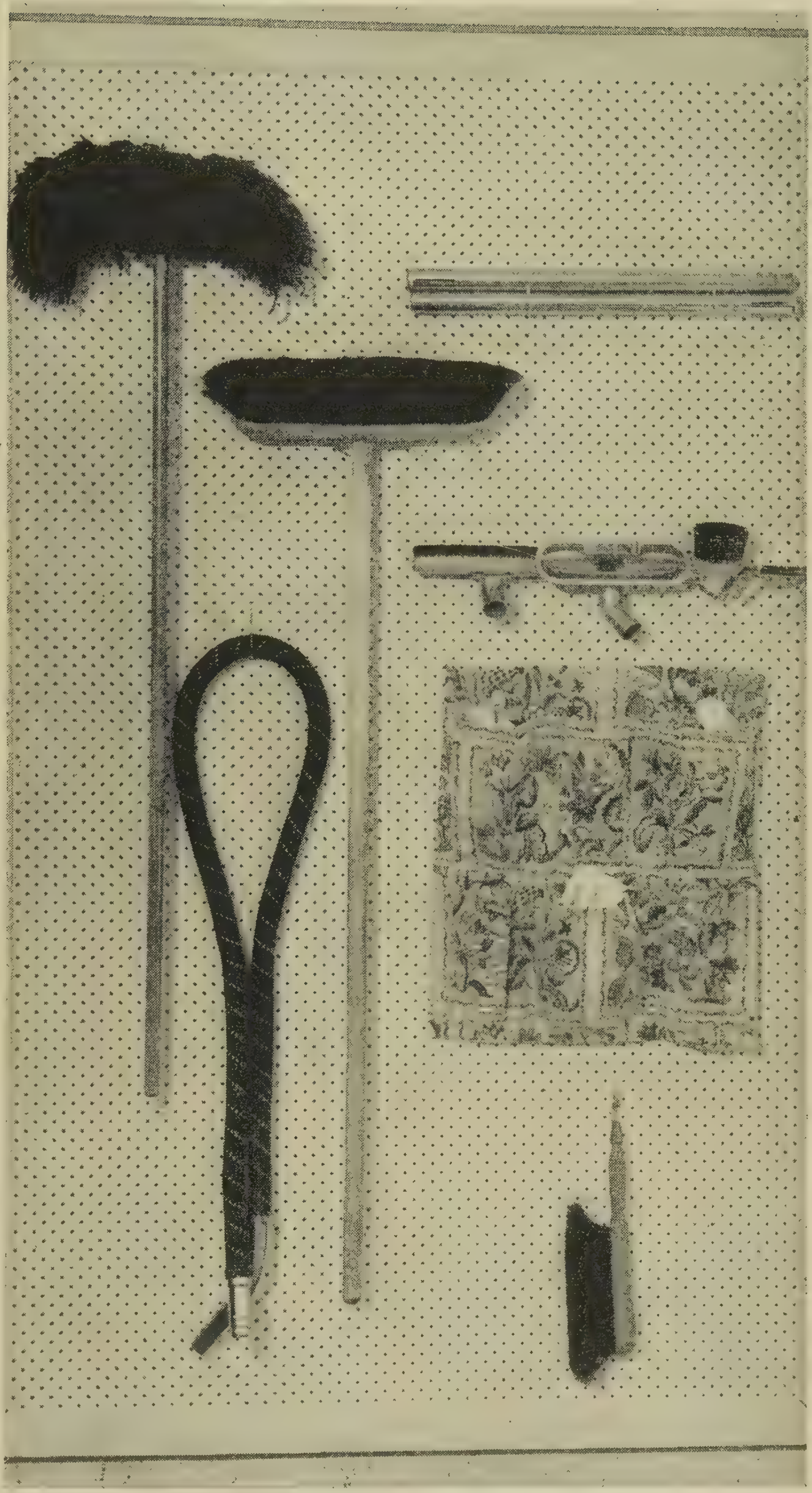
AN essential requirement for good storage is that articles can be quickly and easily put away and quickly and easily located when they are required, and in many homes where good potential storage space is wasted simple carpentry with perforated hardboard would provide such storage.

THOUGH perforated hardboard is now used extensively in commerce for display purposes, its use in the home has not yet been fully exploited. Any home carpenter of average skill and with ordinary tools can use this versatile material to great advantage. It is available in sheets of various sizes with holes perforated either in squares or diamond pattern. After it has been cut to the shape required it can be either attached to standard ¾ in. x ½ in. framing and nailed to a wall or be made up as a separate frame in architrave, as illustrated for hanging on a wall. To allow for the insertion of fittings a ½ in. space is necessary between the wall and the board.

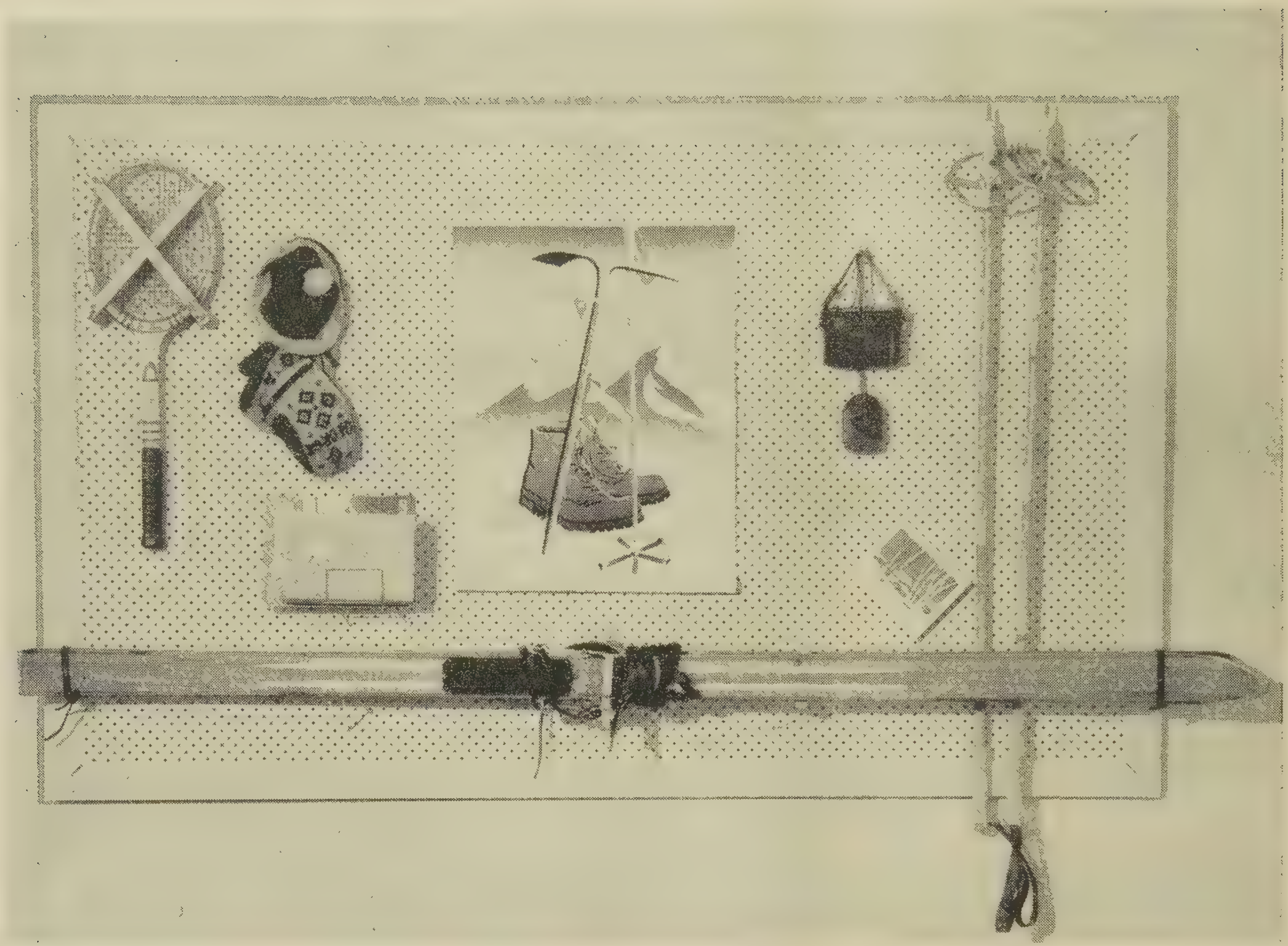
The fittings are chrome plated and are made in various designs suitable for different purposes. They are inserted in the perforations and will hold many articles which because of their shape are awkward to store in drawers or cupboards. In the home the hooks, either the straight ones with single or double prongs or the curved cup ones, are probably most useful. Also available are several sizes of shelf support on which glass or wooden shelving can be placed. A hang bar, 16 in. long, might hold ties in a wardrobe or a teatowel in the kitchen.

The board has decorative value also, as the perforations provide an interesting contrast in texture to plain

← UPPER—Cooking utensils are readily accessible if hung on perforated hardboard above the kitchen working area. As the hooks and other fittings are movable, their position can be changed if required. The perforated hardboard also gives a decorative effect, especially when used for flower pots as shown at right of photograph. LOWER—With perforated hardboard many types of tools can be stored neatly in the garage or workshop.



Brooms, mops, and other cleaning equipment such as vacuum cleaner parts, which are frequently hard to store, can be hung on a perforated hardboard panel attached to a wall or the inside of a cupboard door.



Perforated hardboard is practical and decorative for storing sports gear or displaying hobbies.

walls. Paint or varnish can be applied in the same way as to ordinary hardboard to give a finish appropriate to the surroundings.

In the Kitchen

The upper illustration on page 188 provides a good example of the use of perforated hardboard in the kitchen. Lining the space between the bench surface and the upper cupboards with the board has made available a considerable area of storage space. The cooking utensils are accessible to the work bench and an attractive decorative effect has been achieved.

The board can also be used as lining for the interior of cupboard doors, particularly in the saucepan cupboard for hanging lids, roasting tins, and articles which do not stack easily. In the china cupboard cups or jugs can be hung from suitably designed hooks.

In a full-length cupboard or behind a door brooms and mops, which are frequently hard to store, can be neatly arranged with the ashpan, duster bag, and vacuum cleaner attachments.

In the Workshop

An easily erected lining on one wall of a workshop or garage will provide excellent storage for tools. Searching is eliminated and much time saved when tools are lined up in view and the one required can be selected at a glance.

For Hobbies

A storage panel such as the one illustrated above will appeal to the sporting members of the family. Besides solving the problem of storing cumbersome sports gear it will also unobtrusively encourage tidy habits. Not only the ski-ing enthusiast but the tennis player, cricketer, or fisherman will welcome being able to arrange his equipment in a way which adds "atmosphere" to his room.

Further Possibilities

In informal rooms the board may serve as a background on which to hang pictures. The supporting fixtures can be placed in any position and so allow flexibility in grouping not only of pictures but of other decorative accessories such as indoor plants.

Perforated board could be used to conceal an unused fireplace or a seldom-used coal range or to replace solid board where ventilation is required. This last-named use would apply, for instance, to shelving in a hot-water cupboard or to the door of a vegetable cupboard or laundry bin.

There are other possible storage methods, but when increased facilities within a limited area are required, this comparatively new commodity may provide the solution.

With the exception of the upper photograph, by Oddie, on page 188, all photographs are by Green and Hahn.

Hardanger Embroidery

By PATRICIA M. BAWDEN,
formerly Home Science Instructor,
Department of Agriculture,
Palmerston North

THE attractive hardanger embroidery is so named because it originated in the Hardanger area of Norway, where the peasants used it to trim their clothes, and where it is still widely used for household linens. Traditionally hardanger embroidery was worked on white or natural-coloured fabric with matching threads, this monotone scheme adding to its quiet dignity. The open-work shows up to advantage on a dark background and is therefore very effective for table mats, runners, duchesse sets, or supper cloths, the simplicity of outline making it suitable for use on both traditional and modern furniture.

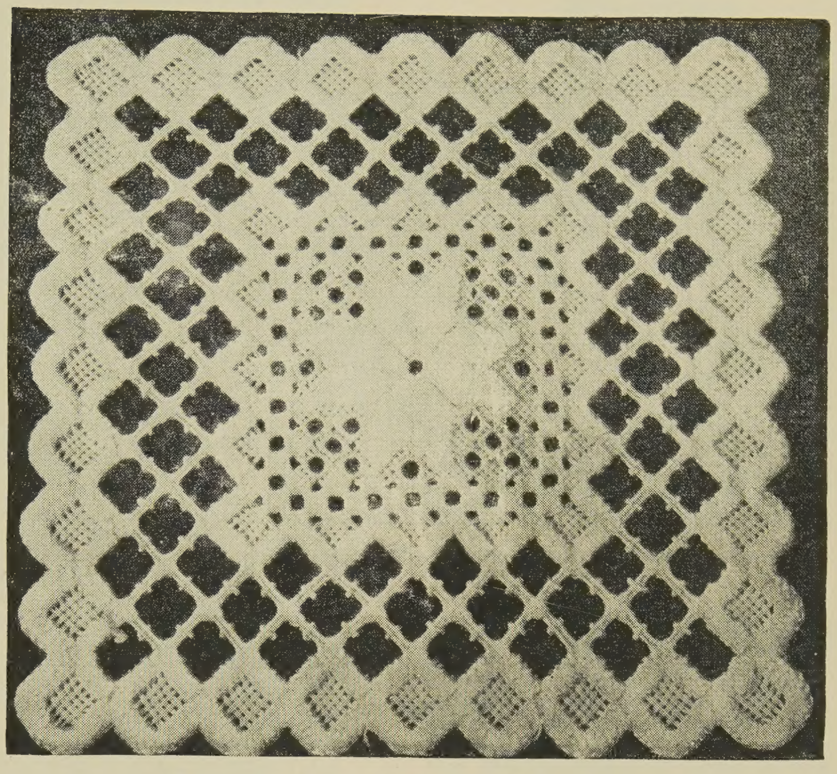


Fig. 1—A square of hardanger-embroidered linen.

HARDANGER work can be used in a border design or as an all-over pattern. It is a simple open-work embroidery made up of blocks of satin stitch outlining open spaces from which the threads have been withdrawn. Variations are added with woven or overcast bars, lacy fillings worked within the open spaces, and flat stitches worked on the solid fabric.

Materials

It is often difficult to secure a suitable fabric for this type of work. It should be of a coarse, even weave with warp and weft threads of similar thickness that can be easily drawn out. If warp and weft threads are not exactly the same thickness, the pattern may take on an elongated appearance. Heavy linens, many of the modern furnishing fabrics, or fine canvas are all quite suitable. Any type of embroidery thread may be used, though originally the tightly twisted cotton and linen threads were more widely used than the softer varieties.

A greater contrast between the outline and the open-work may be obtained by using a coarser thread for the outlining satin blocks than that used for the bars and lacy fillings. Crewel needles may be used for the satin stitch, and blunt needles are best for the needle-weaving of the bars and the filling stitches.

The Design

The main outline of the design is planned first. This is built up on squares, triangles, diamonds, and oblongs. The designs are always geometrical, and because of the simplicity of the work, with practise it will be quite easy to make up new patterns. The fillings and additional surface stitching can be added as the work progresses.

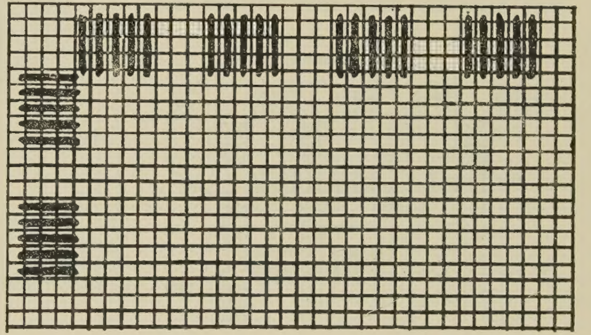


Fig. 2—On a straight side four unstitched threads are left between each satin-stitch block to form the bars.

Stitches

Whereas with ordinary drawn threadwork such as hemstitching the threads are drawn and then worked, with hardanger embroidery the threads are cut and drawn after the edge stitching is completed. This edge stitching consists of satin-stitch blocks called "klosters" which are worked along the outlines of the proposed open spaces. The stitches are worked at right angles to the spaces and five satin stitches are used to cover the four threads of the fabric to be drawn.

Where a straight edge is being used, cover four threads, then leave four unstitched between each block to form the bars (Fig. 2). At a corner or where the side is stepped as in a triangle or pyramid the blocks are worked at right angles to one another (Fig. 3). Correct counting is most important at this stage, for unless it is absolutely accurate, the threads will not draw

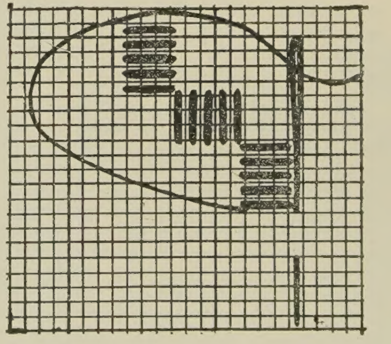


Fig. 3—At corners work the satin-stitch blocks at right angles to one another, five stitches over four threads.

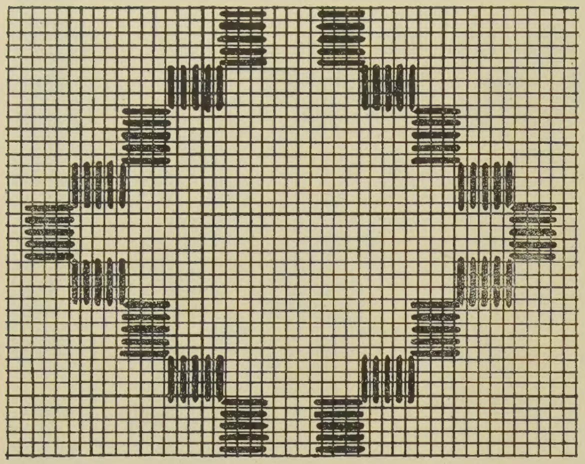


Fig. 4—The completed satin-stitch outline with the threads ready for overcasting.

correctly and the finished design will not link up.

Once the outlining is completed, with very sharp, pointed scissors snip the threads close to the satin stitching at either end and draw out. This will leave a mesh of crossed threads over the open space. This must be very carefully counted and checked to ensure that the same four threads are cut at both ends. This now leaves the satin-stitch outline and the crossed threads ready for weaving and filling (Fig. 4).

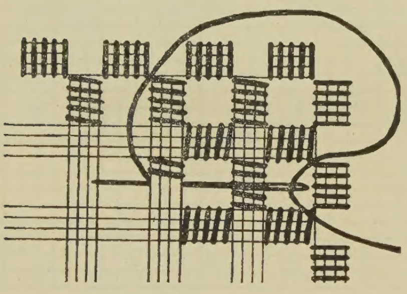


Fig. 5—Overcasting the four threads to form bars.

Either of two methods may be used to work these uncut threads into bars. All four threads may be overcast together as shown in Fig. 5 or they may be woven in pairs with a needle-weaving stitch as in Fig. 6. In needle-weaving the thread ends are covered by the stitches, and in overcasting the ends are run at the edges through the backs of the satin blocks. As the bars are worked small picots may be added for further decoration. Bring the needle to the front between the two pairs of threads, slip the working thread behind it, and bring it round beneath the point. Draw the needle through, making a knot at the edge of the two threads. Take the needle behind two threads, bring it up at the centre, and work another picot over the other two on the opposite side (Fig. 7).

The steps so far described form the first essentials of all hardanger embroidery, that is, the outlining with satin-stitch blocks, cutting and drawing the threads in blocks of four, and the weaving and decorating of the bars. Once these steps have been mastered many attractive articles may be worked.

Fillings

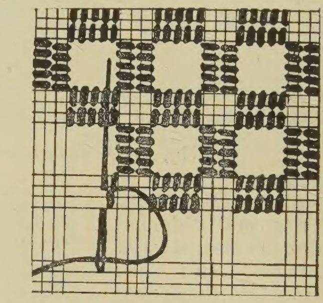


Fig. 6—Needle-weaving through drawn threads.

Further variety and interest may be added to hardanger embroidery by the working of lace-like fillings in the open squares (see Figs. 8 and 9). The first illustrated is a delicate loop filling. First overcast the right-hand bar of the square and then pass the needle to the lower bar. Overcast this one to half way; then take the thread up under the right-hand bar, round to the front, slip it under the working thread which extends from the lower bar, and pass it on to the top of the square, looping it round the bar in the same manner on each of the four sides. At the edge catch through the satin-stitch border. The fourth looping brings the thread back, ready to continue overcasting.

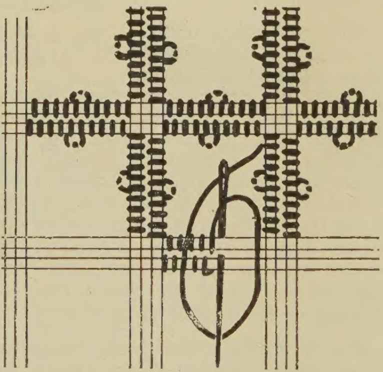
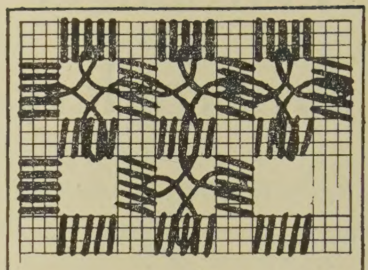


Fig. 7—To make a picot insert the needle into the bar and loop the thread around it.

Fig. 8.



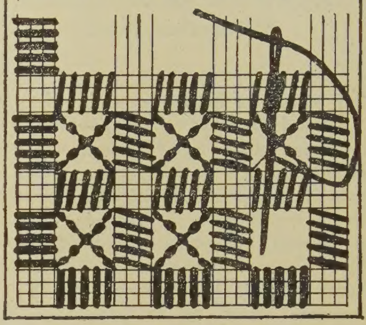


Fig. 9.

Figs. 8 and 9—Examples of lace fillings.

The second type of filling that may be used is worked thus: Overcast or weave the right side of the square from top to bottom. Throw a thread from the lower right-hand corner diagonally across to the top left-hand corner; then twist it back around itself to the bottom right-hand corner again. Work the lower bar and throw the second thread from the lower left-hand corner to the top right-hand corner. Then again twist the thread back, securing the diagonal threads where they cross. These fillings may be worked in every open space between the worked bars or in alternate ones to give a chequered pattern.

Once completed a piece of hardanger work should be pressed very lightly on the right side and then heavily on the reverse side to bring up the stitching. For the beginner it is advisable to tackle a small mat or even try out a triangular design on a small sample until the idea is mastered. Books are available that will give ideas for designs suitable for all types of household linen to which this work may be applied.

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thar's gold in them thar, chilled

Laden trees . . . clean, ripe, unblemished fruit. *There's* a crop any orchardist worth his salt can cash in on. But how many such crops have been sold at a loss through being a perishing nuisance? With a Westinghouse Recold Cool Store, fruit remains unseen and *unhurt* until you are good and ready to pull in profits from reasonable market prices. Could anything be more commonsense? A few moments *now* will bring you a free estimate of one of the most profitable investments you can make. Write to your nearest of the agents listed below for full facts!

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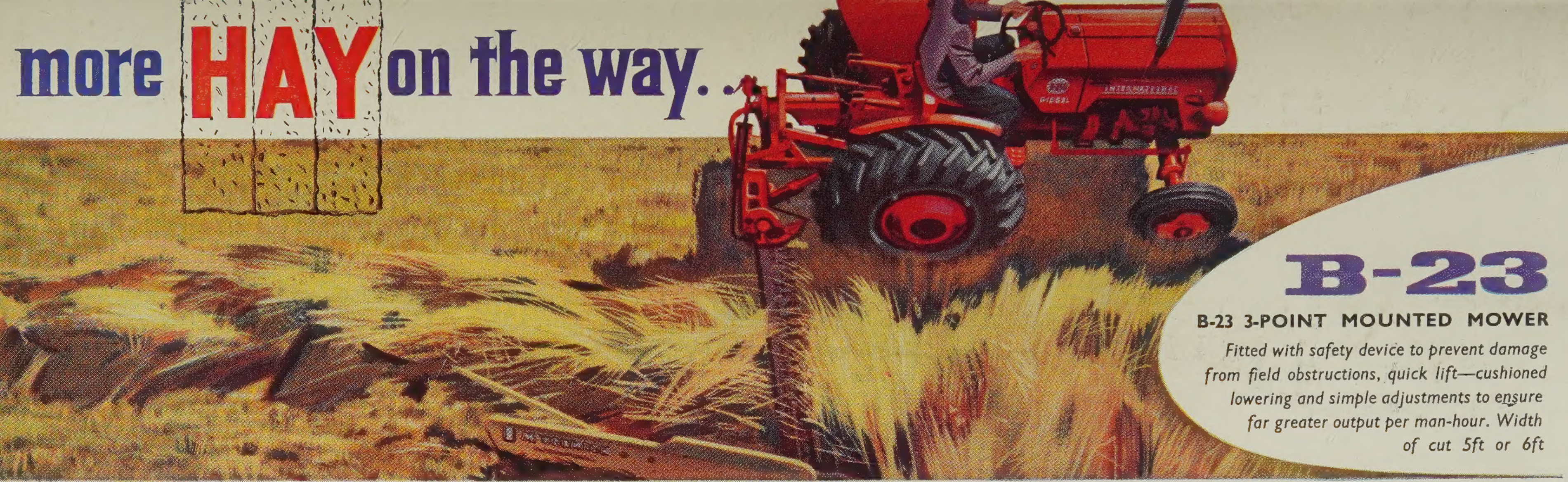
more HAY on the way...

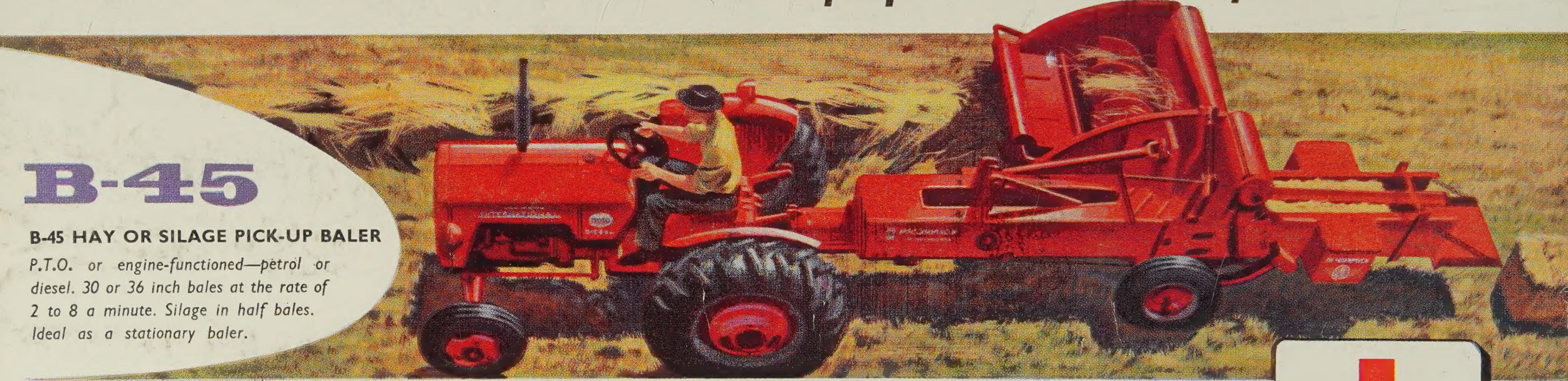


B-23

B-23 3-POINT MOUNTED MOWER

Fitted with safety device to prevent damage from field obstructions, quick lift—cushioned lowering and simple adjustments to ensure far greater output per man-hour. Width of cut 5ft or 6ft

with McCormick International equipment in the field



B-45

B-45 HAY OR SILAGE PICK-UP BALER

P.T.O. or engine-functioned—petrol or diesel. 30 or 36 inch bales at the rate of 2 to 8 a minute. Silage in half bales. Ideal as a stationary baler.

It's a "piece of cake" in the hay season when you bring on a McCormick International B-23 Mower or B-45 Baler! They're in use all over New Zealand by the thousand because like all McCormick International farm machines their cost is within the scope of a farmer's income, the after-sales servicing is 100% assured, and they do a better job that makes their ownership one of the ways to get ahead. Ask your IH Dealer for free information and details.

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